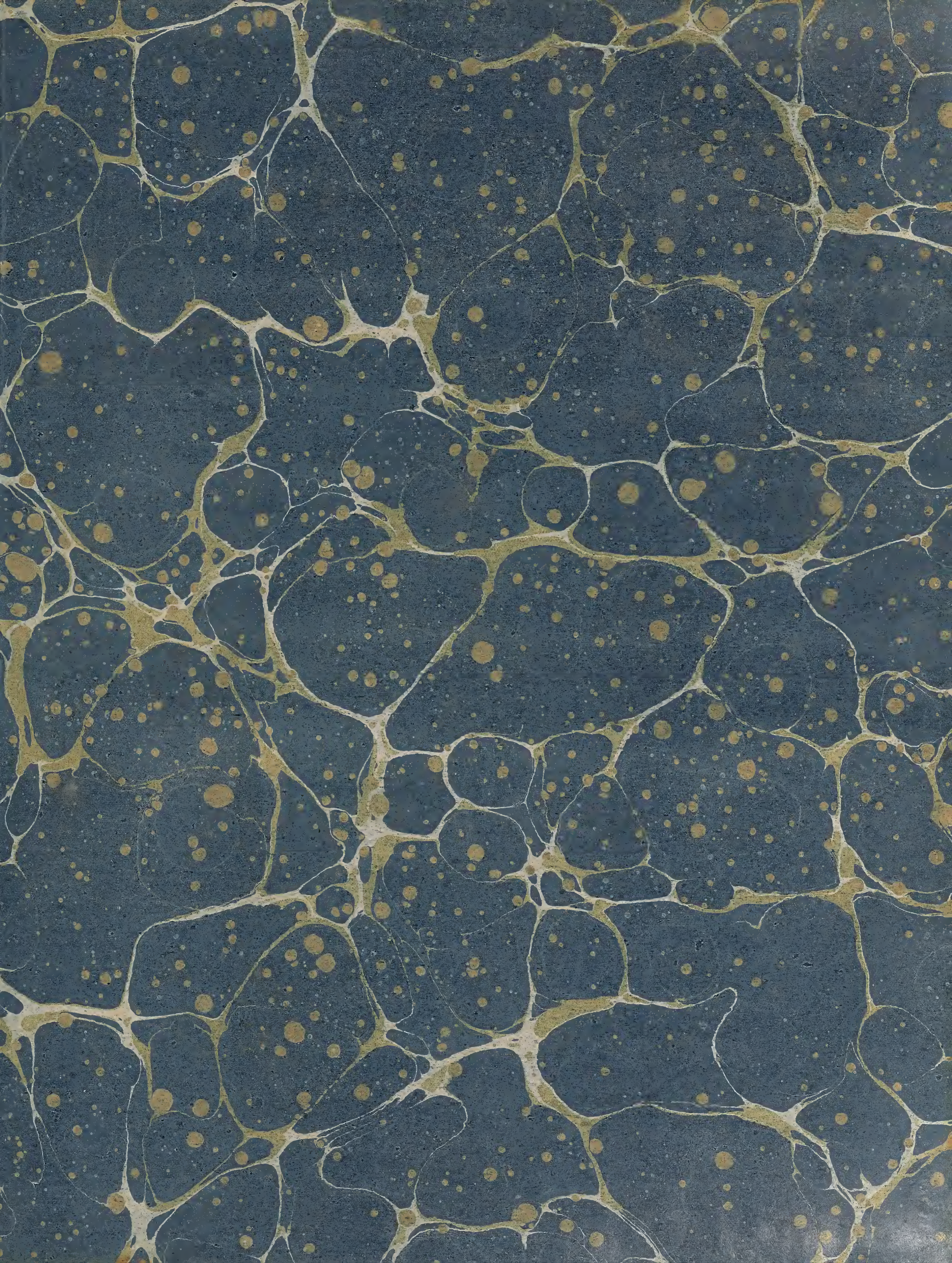






J. C. Mansel-Pleydell.



SCIENTIFIC RESULTS
OF
THE SECOND YARKAND MISSION;

BASED UPON THE COLLECTIONS AND NOTES
OF THE LATE
FERDINAND STOLICZKA, PH.D.

ICHTHYOLOGY.

BY
FRANCIS DAY, F.L.S., F.Z.S.

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SCIENTIFIC RESULTS

OF

THE SECOND YARKAND MISSION.

ICHTHYOLOGY.

BY FRANCIS DAY, F.L.S., F.Z.S.

THE following descriptions refer to the entire collection of fishes obtained during the expedition (except, so far as I know, two specimens¹). With them I have compared some types of Steindachner's excellent paper on Dr. Stoliczka's "Fishes of Tibet" (Verh. z.-b. Ges. Wien, 1866), which specimens were given me by Dr. Stoliczka.

Mr. Hume, C.B., has since then obtained a few more skins of fishes from those regions through the exertions of Dr. Scully. These have likewise been forwarded to me; and one appears to be a very aberrant form of *Ptychobarbus*.

Order PHYSOSTOMI.

Family—*SILURIDÆ*

1. EXOSTOMA STOLICZKÆ. Plate I, fig. 1.

Day, Proc. Zool. Soc. 1876, p. 782.

D. $\frac{1}{6}$, P. $\frac{1}{1\frac{1}{2}}$, V. $\frac{1}{5}$, A. 6, C. 15.

Length of head from 4 in the young² to $5\frac{2}{3}$, of caudal 8, height of body $7\frac{1}{4}$ in the total length. *Eyes* minute, situated in the middle of the length of the head; the width of the interorbital space equals half that of the snout, or the distance between the eye and hind

¹ These two specimens are in the British Museum.

² The remarkable difference in the comparative length of the head to that of the total length is shown in the following figures:—

| 3 specimens | 4 inches in length. | Head 4 | to $4\frac{1}{3}$ in the total length. |
|-------------|---------------------|--------|--|
| 4 | 4.2 to 4.5 | „ | $4\frac{1}{3}$ to $5\frac{1}{4}$ „ |
| 5 | 5.0 to 5.7 | „ | 5 to $5\frac{1}{2}$ „ |
| 3 | 6.0 to 6.6 | „ | $5\frac{1}{2}$ to $5\frac{2}{3}$ „ |
| 2 | 7 | „ | $5\frac{1}{3}$ to $5\frac{1}{2}$ „ |

nostril. *Head* depressed, as broad as long, and obtusely rounded. Mouth inferior; lips thick, and studded with small tubercular elevations; the upper and lower lips continuous at the angle of the mouth; but the transverse fold across the lower jaw is interrupted in the middle. Nostrils close together, the anterior round and patent, the posterior tubular: a barbel divides the two nostrils; it is situated on a bridge of skin, below which the two nostrils are continuous. *Barbels*: the nasal ones reach the hind edge of the eye; the maxillary ones have a broad basal attachment, and reach the root of the pectoral. Of the mandibular barbels the anterior are situated just behind the inner end of the lower labial fold: they are shorter than the outer pair, which latter extend to the gill-opening. *Gill-opening* situated on the side of the head in front and above the base of the pectoral fin. *Teeth*: several rows of pointed ones in each jaw, of which the outer is slightly the larger, rather wide apart, and with rather obtuse summits. *Fins*: the dorsal arises midway between the snout and the commencement of the adipose fin; its greatest height is one-third more than the length of its base; its spine is rudimentary and enveloped in skin. Adipose dorsal very long and low. Pectoral nearly as long as the head, having its outer half horizontal and its inner vertical; its spine is rudimentary, with a broad, striated, cutaneous covering. Ventral of a similar form to the pectoral: its first and a portion of its second ray also with a striated cutaneous covering; the fin commences on a vertical line falling just behind the base of the dorsal fin; it is rather nearer the snout than the posterior end of the adipose dorsal, and commences midway between the bases of the ventral and caudal fins; it is half higher than long. Caudal cut almost square. Free portion of the tail half higher than long. *Skin* tuberculated from the head, along the lower surface of the body, to nearly as far as the base of the ventrals. *Colours*: of a dull yellowish green, becoming lightest along the abdomen. Fins yellowish, with dark edges or bands.

Hab. Basgo, Snima, and Leh on the Upper Indus. The longest specimen 7 inches in length.

I propose here to shortly remark upon the distinction between the six species of *Exostoma* at present known—

A.—*Teeth in jaws pointed.*

1. *Exostoma labiatum*.—Lower labial fold uninterrupted. The interspace between the first and adipose dorsal fins equals two-thirds the length of the latter. Anal commences much nearer the base of the caudal than the base of the ventral. Mishmi Mountains, East Assam.

2. *E. blythii*.—Lower labial fold interrupted. Interspace between dorsal fins very slight. Anal commences in last third of distance between ventral and base of caudal. Head-waters or affluents of Ganges.

3. *E. berdmorei*.—Snout more pointed. Caudal forked. Tenasserim.

4. *E. davidi*¹.—The interspace between the first and adipose dorsal fins equals the length of the latter. Pectoral reaches the ventral. Eastern Tibet.

5. *E. stoliczkae*.—Lower labial fold interrupted. Anal commences nearer the base of the ventral than that of the caudal. Pectoral does not extend to the ventral. Upper waters of Indus.

B. *Outer row of teeth flattened.*

6. *E. andersonii*.—Lower labial fold interrupted. Bhamo, Burmah.

¹ *Chimarrichthys davidi*, Sauvage.

Family—CYPRINIDÆ

The majority of the fishes in the collection consist of carps, those from the more elevated regions being confined to such as have the vent and base of the anal fin bounded by a row of tiled scales, or the ubiquitous Loaches.

2. OREINUS SINUATUS.

Only one species of *Oreinus* exists in this collection, the *O. sinuatus*, Heckel, from Leh in Ladák, and which has likewise been captured in Kashmir. Although some of the fish were obtained in Kashmir, where the genus *Oreinus* has representatives, there was no example from that locality.

Having observed upon the great variation in proportions existing in a species of *Exostoma* captured on the hills, it may be worth while drawing attention to the same fact as occurring in specimens of this genus. Thus, in examining the following ten examples of *O. richardsonii*, Gray, in the British Museum, I found them as follows:—

| | | |
|---|---|---|
| 4 | specimens, in spirit, from 3.3 to 3.8 inches in length. | Head from 4 to $4\frac{2}{3}$ in the total. |
| 1 | specimen, in spirit, 4 inches in length. | Head $4\frac{1}{4}$ in the total. |
| 1 | „ „ 5 $\frac{1}{2}$ „ „ | $4\frac{1}{2}$ „ |
| 1 | „ „ 9 „ „ | $5\frac{1}{3}$ „ |
| 1 | „ stuffed, 10 „ „ | 5 „ |
| 1 | „ „ 15 „ „ | $5\frac{1}{3}$ „ |
| 1 | „ „ 18 „ „ | 6 „ |

3. SCHIZOTHORAX CHRYSOCHLORUS. Plate I, fig. 2.

Racoma chrysochlorus, M'Clelland, Cal. Journ. Nat. Hist., ii., p. 577., t. xv., f. 3.

Schizothorax biddulphi, Günther, Ann. & Mag. Nat. Hist., 1876, xvii., p. 400.

Schizothorax chrysochlorus, Day, Proc. Zool. Soc., 1876, p. 784.

B. iii. D. $\frac{4}{7-8}$, P. 18, V. 10, A. $\frac{2}{3}$, C. 20, L. l. 110 to 120.

Length of head $4\frac{3}{4}$ to $5\frac{1}{3}$, of caudal 6 to $6\frac{1}{3}$, height of body $6\frac{1}{2}$ in the total length. *Eyes*: Diameter $5\frac{1}{2}$ (in a fish 7 inches long), 7 to 9 in the length of head, 2 to $2\frac{1}{2}$ diameters from the end of snout, and the same apart. Upper surface of the head nearly flat; its width rather exceeds its height, and equals half its length. Snout rather compressed, and overhanging the upper jaw. Mouth directed forwards, horseshoe-shaped, the lower labial fold interrupted in the middle. The maxilla reaches to below the front nostril. The depth of the cleft of the mouth equals the width of its gape. A very thin horny covering to the inside of the lower jaw. Posterior edge of opercle cut square. *Barbels*: the rostral ones as long as the eye, the maxillary rather longer, sometimes twice as long, and reaching to beneath the middle or hind edge of the orbit. *Teeth* pharyngeal 5, 3, 2, 2, 3, 5 pointed, and with rather compressed summits. *Fins*: the dorsal, which is as high as the body, arises midway between the end of the snout and the base of the caudal, its last undivided ray osseous, strong, finely serrated posteriorly, from a little longer than the head, in a specimen 11.9 inches in length, to $\frac{4}{5}$ the length in the adult. Pectoral as long as the head excluding the snout; it reaches halfway to the base of the anal. Anal, when laid flat, reaches about

halfway to the base of the caudal, which latter fin is forked. *Scales*: the row which bears the lateral line consists of larger scales than those above or below it; those forming the anal sheath are equal to half a diameter of the eye. *Colours* greyish along the back, becoming yellowish-white on the sides and beneath; a black mark over the eye, and a few dull spots on the back.

Hab. Káshghar, Yangihissár, and Yárkand, up to 20 inches in length: also Afghanistan.

Dr. Scully collected four specimens in Káshghar (4,043 feet above the sea), which are 13, 16, 17, and 18 inches respectively in length.

4. SCHIZOTHORAX PUNCTATUS. Plate I, fig. 3.

Day, Proc. Zool. Soc., 1876, p. 785.

B. iii., D. $\frac{4}{8}$, P. 20, V. 11, A. $\frac{2}{5}$, C. 20.

Length of head $3\frac{3}{4}$ to 4, caudal $5\frac{1}{2}$, height of body 6 to 7 in the total length. *Eyes*: diameter $6\frac{2}{3}$ in the length of head, $2\frac{1}{2}$ diameters from end of snout, and 2 apart. Inter-orbital space flat. The greatest width of the head exceeds its height by one-fourth, and is $\frac{4}{5}$ of its length. Mouth anterior, with the upper jaw somewhat the longer; the cleft commencing opposite the middle of the eyes, whilst the maxilla reaches to below the front edge of the orbit. Lower labial fold interrupted in the middle. A thin striated horny covering to the lower jaw. *Barbels*: the maxillary ones equal the diameter of the eye; the rostral ones are slightly longer. *Fins*: dorsal rather higher than the body; it commences midway between the front edge of the eye and the base of the caudal fin; its last undivided ray is strong, coarsely serrated posteriorly, and as long as the postorbital portion of the head. Pectoral does not quite reach the ventral, which latter arises on a vertical line below the first articulated dorsal ray, and extends two-thirds of the distance to the anal. Anal rather above twice as deep as its base is long; when laid flat it does not extend to the commencement of the caudal. Free portion of the tail one-half longer than deep at its highest part. *Scales*: those along the lateral line larger than those above or below it. The tiled row along the base of the anal fin small, and equalling one-third of the diameter of the orbit. *Colours*: silvery, covered with largish black spots.

Racoma nobilis, M'Clelland, has more fleshy lips, whilst the mouth appears more transverse, as in *Oreinus*, and the under jaw much the shorter.

Hab. Kashmir Lake.

5. SCHIZOTHORAX ESOCINUS. Plate I, fig. 4.

Schizothorax esocinus, Heckel, Fische Kasch, p. 48, t. ix.; M'Clelland, Cal. Journ. Nat. His., ii., p. 579; Günther, Cat. vii., p. 166. Day, Proc. Zool. Soc., 1876, p. 785.

B. iii., D. $\frac{4}{8}$, P. 20, V. 10, A. 7, C. 20.

Length of head $4\frac{1}{2}$ to $4\frac{3}{4}$, of caudal $5\frac{3}{4}$; height of body $7\frac{1}{4}$ in the total length. *Eyes*: diameter $6\frac{1}{2}$ in the length of head, 2 diameters from end of snout and also apart. Inter-orbital space flat. The greatest width of the head equals its height or its postorbital length. Mouth very slightly oblique, horse-shoeshaped, the upper jaw longer than the lower, the maxilla reaching to nearly below the front edge of the eye. Lower labial fold interrupted

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in the middle. A horny covering to inside of lower jaw. *Barbels*: the rostral ones more than half longer than the eye, reaching to below its first third; the maxillary ones are slightly shorter. *Fins*: the dorsal as high as the body; it commences midway between the nostrils and the base of the caudal; its last undivided ray osseous, coarsely serrated posteriorly, and its bony portion being as long as the head, excluding the snout. Pectoral does not quite reach the ventral, which latter fin commences on a vertical line slightly behind the origin of the dorsal, and extends two-thirds of the distance to the anal. Length of base of anal $\frac{3}{7}$ of its height; it reaches, when laid flat, to the base of the caudal, which latter fin is deeply forked. Free portion of the tail as high at its base as it is long. *Colours* silvery, with numerous black spots, most distinct in the upper half of the body.

Hab. Leh, on the Upper Indus, Kashmir, and Afghanistan.

6. SCHIZOTHORAX INTERMEDIUS. Plate II, fig. 1.

Schizothorax intermedius, M'Clell., Cal. Journ. Nat. Hist. 1842, ii, p. 579; Günther, Cat. vii, p. 165.

B. iii., D. $\frac{4}{7-8}$, P. 19, V. 10, A. $\frac{2}{6}$, C. 20, L. 1. 105.

Length of head $4\frac{3}{4}$, of caudal 5 to 6, height of body 6 in the total length. *Eyes*: diameter $5\frac{1}{2}$ in the length of head, $1\frac{2}{3}$ diameter from the end of snout and also apart. Upper surface of the head flat; its greatest width equals its postorbital length, whilst its height equals its length excluding the snout. Upper jaw rather longer than the lower, and not overhung by the snout. Mouth horseshoe-shaped, the depth of the cleft equalling the width of its gape. The maxilla reaches to below the hind nostril. Lower labial fold interrupted in the middle. A thin, smooth, deciduous horny covering to the lower jaw. *Barbels* four, as long as the eye in the young, longer in the adult. *Teeth*: pharyngeal, 5, 3, 2, 2, 3, 5, pointed and rather crooked at their summits. *Fins*: dorsal as high as the body in the young, not quite so high in the adult; it commences midway between the end of the snout or front nostril and base of the caudal; its last undivided ray strong, rather coarsely serrated posteriorly, one-half to two-thirds as long as the head in the immature, four-fifths of its length in the adult. Pectoral as long as the head excluding the snout, and reaching more than half-way to the base of the ventral, which latter fin arises below the first dorsal ray and extends more than half-way to the anal. The length of the base of the anal equals half its height, which latter equals the length of the pectoral; if laid flat it almost reaches the base of the caudal, which is forked. *Scales*: depth of those in tiled row equals half a diameter of the eye. Free portion of the tail about as high at its commencement as it is long. *Colours* silvery, usually without spots; but in some specimens from Yangihissár there are minute black spots on the upper half of the body.

Hab. Káshghar, Yangihissár, and Sarikol. M'Clelland likewise obtained it (through Griffith) from Afghanistan, the Cabul River at Jellalabad, and Tarnuck River. He sent three specimens to the East India Museum.

7. SCHIZOTHORAX MICROCEPHALUS. Plate III, fig. 2.

Day, Proc. Zool. Soc., 1876, p. 787.

B. iii., D. $\frac{3}{9}$, P. 18, V. 11, A. $\frac{2}{5}$, C. 18, L. 1. 105, L. tr. 25/.

Length of head 5 to $5\frac{1}{2}$, of caudal 6, height of body $5\frac{3}{4}$ to 6 in the total length. *Eyes*: diameter 7 in the length of head, $2\frac{1}{4}$ diameters from end of snout, and $2\frac{1}{4}$ apart. Interorbital,

space flat. The greatest width of the *head* equals its length behind the middle of the eyes; its height equals its length excluding the snout. *Mouth* broad, anterior, with the upper jaw the longer, and overhung by the snout; the cleft of the mouth nearly horizontal; it extends to below the hind nostril, and is scarcely above half the extent of its gape; lower labial fold interrupted in the middle. A thin horny covering to the lower jaw. *Barbels*: the rostral ones reach to below the hind edge of the eye, the maxillary ones to the hind edge of the preopercle. *Fins*: dorsal anteriorly nearly as high as the body, commencing slightly nearer the snout than the base of the caudal fin, or midway between the two; its last undivided ray weak, articulated, and with some very small obsolete denticulations posteriorly about its centre (absent in some specimens). Pectoral as long as the head behind the front nostril, and reaching rather above half-way to the ventral, which latter is shorter than the pectoral, reaching about half-way to the base of the anal. Anal almost reaching base of caudal when laid flat, the length of its base being only one-third of its height. Caudal with rounded lobes. Free portion of the tail rather longer than high. *Scales*: in the first third of the body those along the lateral line are larger than those above or below them, but posteriorly they are of the same size; the tiled row equal about half the diameter of the eye. *Colour* silvery.

M'Clelland says of *S. edeniana* that its spine is slender, soft, and denticulated at its base, but the reflected fold of the lower lip is uninterrupted. *Racoma gobioides*, M'Clell., from the Bamean River, shows the head almost as short as in this species; but it has a strong serrated dorsal spine, whilst that fin is on an elevated base. The anal does not appear to reach above half-way to the base of the caudal.

Hab. The specimens are from Panjah (9,000 feet) in Wakhán, the waters going to the Oxus. The dorsal spine approaches that of *Ptychobarbus*.

8. SCHIZOTHORAX IRREGULARIS. Plate IV, fig. 1.

Day, Proc. Zool. Soc., 1876, p. 787.

? *Schizothorax edeniana*, M'Clell., Cal. Journ. Nat. Hist. ii, p. 579.

B. iii, D. $\frac{3}{5}$, P. 18, V. 9, A. $\frac{2}{5}$, C. 20, L. 1. 98, L. tr. 26/.

Length of head 5, of caudal 6, height of body 6 in the total length. *Eyes*: diameter $6\frac{1}{2}$ in the length of head, $2\frac{1}{2}$ diameters from the end of snout, and about 2 apart. Interorbital space nearly flat. The greatest width of the *head* equals its height or its length behind the orbit. *Mouth* narrow; the upper jaw slightly the longer, and only slightly overhung by the snout. Cleft of mouth a little oblique, its width equal to its length, and the maxilla reaching to beneath the front nostril. Lips very thick, lobed in the centre, and with an interrupted labial fold. *Barbels*: the rostral ones reach to below the front edge of the eye; the maxillary ones are one-half longer than the diameter of the eye. *Fins*: dorsal anteriorly about two-thirds as high as the body below it: its last undivided ray weak, very feebly serrated posteriorly, whilst the extent of its osseous portion does not exceed one-third of the length of the head; the fin commences midway between the front edge of the eye and the base of the caudal fin. Pectoral as long as the head excluding the snout, and reaching half-way to the ventral, which latter is rather shorter and extends rather more than half-way to the base of the anal. Anal two-fifths as long at its base as it is high; when laid flat it almost reaches the caudal, which latter is slightly forked. Free portion of the tail rather longer than high at its base. *Scales*: those behind the pectoral region to as far as the end of the anal, and below the lateral line, are much smaller than those above the lateral line. The tiled row small, not above

half the diameter of the eye. *Colours* silvery, becoming lightest and glossed with gold below the lateral line.

Hab. The specimen described is stuffed, and 20·5 inches in length. It was obtained at Tash-kurgan in Sarikol. If this is identical with *S. edeniana*, M'Clell., it is also found in the Cabul River, in the Mydan Valley, and Sir-i-chusmah.

9. SCHIZOTHORAX NASUS. Plate IV, fig 3.

Schizothorax nasus, Heckel, Fische Kasch., p. 33, t. vi.; Günther, Cat. vii., p. 166.

B. iii, D. $\frac{4}{8}$, P. 18, V. 10, A. $\frac{2}{5}$, C. 19, L. 1. 90-100.

Length of head $4\frac{2}{3}$, of caudal $5\frac{1}{2}$, height of body 5 in the total length. *Eyes*: diameter $5\frac{1}{2}$ in the length of head, $1\frac{1}{2}$ diameter from the end of snout, and also apart. Dorsal profile more convex than that of the abdomen. Upper surface of the *head* nearly flat; its greatest width equals its postorbital length, while its height equals its length excluding the snout. Upper jaw rather longer than the lower and overhung by the snout. *Mouth*: horseshoe-shaped, its gape equalling its cleft. The maxilla reaches to below the hind nostril. Lower labial fold interrupted. *Barbels*: four; the maxillary ones two-thirds as long as the eye; the rostral ones slightly shorter. *Fins*: dorsal as high as the body below it; it commences midway between the middle of the eye and the base of the caudal fin; its last undivided ray is strong, rather coarsely serrated, and nearly as long as the head. Pectoral about as long as the head excluding the snout, and reaching above half-way to the base of the ventral, which latter fin arises below the last undivided dorsal ray, reaching half-way to the base of the anal, which is above twice as high as wide at its base, and nearly reaches the caudal when laid flat. *Scales*: depth of those in the tiled row scarcely one-third of the diameter of the eye. Free portion of the tail not quite so high at its commencement as it is long. *Colours*: silvery, with black spots on the upper half of the body.

This species has a more elevated dorsal profile and shorter barbels than *S. intermedius*.

Hab. Kashmir Lake.

10. PTYCHOBARBUS CONIROSTRIS. Plate III, fig. 3.

Ptychobarbus conirostris, Steindachner, Verh. z.-b. Ges. Wien., 1866, p. 789, t. xvii, f. 4; Günther, Cat. vii., p. 169.

B. iii, D. $\frac{2}{8}$, P. 22, V. 10, A. 7-8, C. 19, L. 1. 95, L. tr. 24/.

Length of head $4\frac{3}{4}$ to 5, of caudal $7\frac{1}{4}$, height of body $6\frac{1}{4}$ to $6\frac{3}{4}$ in the total length. *Eyes*: diameter from $4\frac{1}{4}$ to $5\frac{1}{4}$ in the length of the head, 2 diameters from the end of snout, and $1\frac{1}{4}$ apart. The greatest width of the *head* equals its postorbital length, but is slightly less than its height. *Mouth*: horseshoe-shaped, with the upper jaw a little the longer, and rather overhung by the snout; the maxilla reaches to below the front edge of the eye. Lower labial fold very broad, uninterrupted, and with a cleft in the median line posteriorly. *Barbels*: a pair at the angle of the mouth, which reach the posterior edge of the preopercle; in a small specimen, 3·1 inches long, they only equal half a diameter of the eye in extent. *Teeth*: pharyngeal ones in two rows. *Fins*: the dorsal commences much nearer the snout than the base of the caudal, its entire base being equidistant from these two points; it has no osseous ray, and is as high as the body below it. Pectoral as long as the head behind the nostrils, and

does not reach quite so far as the ventral, which latter fin arises under the last few dorsal rays and reaches two-thirds of the distance to the base of the anal. The anal, when laid flat, reaches the base of the caudal, its base is $2\frac{1}{3}$ in its height. *Scales*: the tiled row small, not one-third of the diameter of the eye. *Colours*: silvery, darkest along the back and upper half of body, where most of the scales have black margins, thus causing small reticulations in the colour. Upper surface of the head spotted with black; some dark spots on the dorsal fin, and sometimes a few light ones on the caudal.

Hab. Head-waters of Indus, Hanle in Tibet, and Chiliscomo, near Drás.

11. PTYCHOBARBUS LATICEPS. Plate III, fig. 1.

Day, Proc. Zool. Soc. 1876. p. 789.

B. iii, D. $\frac{4}{6}$, P. 18, V. 9, A. ?, C. 20, L. 1. 145.

Length of head $4\frac{1}{4}$, of caudal $9\frac{1}{2}$, height of body 7 in the total length. *Eyes*: diameter 12 in the length of head, $2\frac{1}{2}$ diameters from the end of snout, and also apart. *Mouth* anterior, with the lower jaw somewhat the longer; the depth of the cleft of the mouth equals half the width of the gape. Upper surface of the head broad, its width being nearly twice its height. No lower labial fold under the mandible. *Barbels*: a maxillary pair as long as the eyes. *Fins*: dorsal arises slightly nearer the base of the caudal than the end of the snout; its last undivided ray weak, articulated at its extremity, and not serrated. Pectoral two-fifths as long as the head. Ventral arises below the anterior dorsal rays. Caudal forked. *Scales* are scarcely imbricated, but cover the entire body; those forming the tiled sheath along the base of the anal fin are two-thirds of the diameter of the eye. *Colours* silvery superiorly, becoming dull white beneath; a few blackish spots along the back.

This interesting skin has unfortunately had its anal fin removed, whilst the pharyngeal teeth have not been preserved. The specimen is 52 inches in length.

It may be considered that as this fish differs from *P. conirostris* in the form of its mouth and snout, also in the position of the ventral fin, it might form a new genus; but we have yet much to learn of the mountain barbels; perhaps a more extensive acquaintance will diminish the number of genera into which they are at present subdivided.

Hab. Káshghar (4,043 feet elevation), the river from which place eventually joins the Yarkand River.

12. PTYCHOBARBUS LONGICEPS. Plate IV, fig. 2.

Day, Proc. Zool. Soc., 1876, p. 790.

B. iii, D. $\frac{4}{8}$, P. 19, V. 12, A. $\frac{2}{5}$, C. 20, L. 1, 112, L. tr. 31.

Length of head $3\frac{2}{3}$ to 4, of caudal 7 to $7\frac{1}{2}$, height of body $5\frac{1}{2}$ to 6 in the total length. *Eyes*: diameter 7 to 9 in the length of head, $1\frac{1}{2}$ diameter from the end of snout, and 2 apart. *Mouth* anterior, cleft oblique, commencing superiorly opposite the upper margin of the eye. Lower jaw somewhat the longer; the maxilla reaches to below the middle of the eye. The greatest width of the head rather exceeds its height, and equals half its length. Interorbital space flat. No lower labial fold under the mandibles. *Barbels*: a maxillary pair half as long as the eye. *Fins*: the dorsal commences midway between the hind edge of the preopercle and the base of the caudal fin. Its last undivided ray is osseous, of moderate

strength, and very finely serrated posteriorly; its osseous portion equals a little above one-fourth of the length of the head. Pectoral half as long as the head, and reaches half-way to the ventral; the latter fin commences under the first divided dorsal ray, and does not extend quite half-way to the root of the anal. Anal twice as high as its base is long; it does not reach the caudal when laid flat; the latter fin forked. *Scales* oval, nearly as wide as high and slightly imbricate; the tiled row half the diameter of the eye. Free portion of the tail rather longer than high. *Colours* bluish on the back, lightest below, dorsal and caudal spotted.

Hab. Yárkand, whence the stuffed specimen described was brought. It is 31 inches in length. This species scarcely accords with the definition of *Ptychobarbus*, the last undivided dorsal ray being osseous and finely serrated. The specimen, however, is large, whilst *P. laticeps* forms the intermediate form between it and *P. conirostris*.

13. SCHIZOPYGOPSIS STOLICZKÆ. Plate II, fig. 2.

Schizopygopsis stoliczkæ, Steind. Verh. z.-b. Ges. Wien., 1866, p. 785; Günther, Cat. vii, p. 170.

B. iii, D. $\frac{3-4}{7-8}$, P. 13, V. 11, A. $\frac{2}{5-6}$, C. 19.

Length of head 5 to $5\frac{3}{4}$, of caudal $5\frac{1}{2}$ to $5\frac{3}{4}$, height of body 7 to 8 in the total length. *Eyes*: diameter 4 to 5 in the length of head, 1 to $1\frac{1}{2}$ diameters from end of snout, and $1\frac{1}{2}$ to 2 apart. The greatest width of the head equals its length behind the middle of the eyes; and its height equals its length excluding the snout. *Mouth* inferior, overhung by the snout; the maxilla reaches to below the front edge of the eye. A sharp, anterior, horny edge to the mandible. *Barbels* absent. *Fins*: the dorsal commences about midway between the end of the snout and the root of the caudal; its upper edge is nearly straight, oblique; the fin is as high as the body below it, and one-third higher than its base is long; its last undivided ray osseous and finely serrated posteriorly. Pectoral not quite so long as the head, and reaching rather above half-way to the ventral, which latter, arising below the middle of the dorsal, is slightly the shorter, and does not reach the anal. Anal, when laid flat, reaches the base of the caudal; it is rather above twice as high as its base is long. Caudal deeply forked. Free portion of the tail as high as long. *Lateral line* at first descends gently, and then reascending, attains the middle of the body opposite the posterior extremity of the dorsal fin. *Colours* olive superiorly, becoming white on the sides and beneath; the whole covered with irregular blackish spots.

The ova are comparatively large. The serrated dorsal spine is strongest in specimens from Leh.

These fishes appear to be much attacked by parasites, which occasion yellowish elevated tubercles, not only on the head and body, but also on the dorsal fin.

One specimen, from Balakchi, had a shot (No. 2) imbedded in the isthmus, where the parts around it had healed.

Hab. Leh, Tánkse, and fry or small fish from Lukong and Chagra (15,090 feet), all from waters directly or indirectly going to the Indus. Some fry from Sarikol, the waters of which go to the Yarkand River¹, Aktash, Upper Kara-kul and Panjah, tributaries of the Oxus or Amu River. This fish has also been taken at Gnari Khorsum by Schlagintweit.

¹ I am very dubious of these specimens, and hardly think they can have been obtained from waters that flow into the Yárkand River, as the adults have not been obtained thence. The adult, however, has been taken in the Oxus; and I find by the diary that on the day the specimens in question were captured the camp was at Sarikol, a few miles from a valley where a stream enters the Aksu River, a tributary of the Oxus.

Largest specimen 8.5 inches in length. There is also a specimen from Balakchi, the streams there apparently flowing towards the Yarkand River, which goes to the east.

14. DIPTYCHUS MACULATUS. Plate II, fig. 3.

Diptychus maculatus, Steindachner, Verh. z.-b. Ges. Wien., 1866, p. 787; Günther, Cat. vii., p. 171. Day, Proc. Zool. Soc., 1876, p. 792.

Diptychus severzowi, Kessler, Fish. Turkestan, p. 17, t. iv, f. 12.

B. iii, D. $\frac{2-3}{8-9}$, P. 19, V. 9, A. $\frac{2}{5}$, C. 19, L. 1. 80-90.

Length of head 5 to 6, of caudal 5 to 6; height of body $7\frac{1}{2}$ to 8 in the total length. *Eyes*: diameter $4\frac{1}{2}$ in the young to 6 in the adult in the length of the head, $1\frac{1}{4}$ to 2 diameters from the end of snout, and $1\frac{1}{2}$ apart. The greatest width of the head equals its height, or its length behind the front edge or middle of the eyes. *Mouth* transverse, inferior, having an anterior sharp horny covering on the lower jaw. Lower labial fold interrupted in the middle. *Barbels*: one at each maxilla, having thick bases, and hardly so long as the eye. *Teeth* pharyngeal, 4, 3, 3, 4, curved at the outer extremity and pointed. *Fins*: the dorsal commences rather nearer the snout than the base of the caudal, its upper edge is straight; it is as high as the body below it, its last undivided ray articulated. Pectoral not quite so long as the head; it reaches rather above half-way to the ventral, which latter commences on a vertical line below the last dorsal ray; it reaches rather above half-way to the base of the anal. Anal when laid flat reaches the base of the caudal; its height is nearly three times the length of its base. *Scales* not imbricated, but scattered over the upper two-thirds of the body and pectoral region, in which latter locality the skin is often rugose: the tiled row well developed. Free portion of the tail one-half longer than high at its base. *Colours* bluish, lightest inferiorly, indistinctly blotched and spotted along the upper half of the body; often a narrow, dull band along the lateral line, and a second below it. The dorsal and caudal fins much spotted in some specimens.

The very young are destitute of scales; they first appear along the lateral line. One specimen from Basgo, 1.1 inch long, has no barbel on the left side. There are two specimens from the west of Sarikol: one has an adipose lid, covering the anterior half of the left eye; the other has a similar lid covering the lower half of the left eye. Brown tubercles are common on some of the specimens, and do not appear to be normal. Some specimens from Leh have the eye small.

Diptychus severzowi, from the Rivers Aksai and Ottuck appears to be the above species.

Hab. Specimens were brought from Kharbu, Basgo, Snima, Leh, Tánkse, and Chagra, from waters going directly or indirectly to the Indus; from Pasrobat (9,370 feet), and Tarbashi (11,515 feet), whence the waters go to the Yarkand River; also from west of Sarikol, which goes to the same river. Some specimens are also labelled as from Chilisco.

This fish has also been captured in other parts of Tibet, and likewise in Nepal.

15. LABEO SINDENSIS. Plate II, fig. 4.

Cirrhitina sindensis, Day, Proc. As. Soc., Beng., 1872, p. 319.

B. iii, D. 12-13, P. 18, V. 9, A. 7, C. 19, L. 1. 43, L. tr. 8-9.

Length of head $6\frac{1}{4}$, of caudal $4\frac{1}{4}$; height of body $5\frac{1}{4}$ in the total length. *Eyes*: diameter $5\frac{1}{2}$ in the length of the head, 2 diameters from the end of the snout, and $2\frac{1}{2}$ apart. Snout

rather overhanging the mouth, without any lateral lobe. Lips continuous at the angle of the mouth, and having a thin cartilaginous covering. *Barbels*: a short maxillary, but no rostral pair.

Hab.—Sind, Punjab, and the Deccan. The specimen figured came from Murree.

16. CIRRHINA GOHAMA.

Cyprinus latius and *gohama*, Hamilton Buchanan, Fishes of Ganges, pp. 346, 393.

Barbus diplochilus, Heckel, Fisch. Kasch., p. 53, t. x, f. 1.

Tylognathus barbatulus, Heckel, Hügel's Reise, iv., p. 376.

Chondrostoma wattanah, Sykes, Trans. Zool. Soc., ii., p. t. 62, f. 4: Bleeker, Beng., p. 25.

Gonorrhynchus brevis, M'Clell and Ind. Cypr. p. 373, t. 43, f. 6.

Crassocheilus latius and *gohama*, Bleeker, Prod. Cypr., p. 110; Günther, Cat. vii., p. 72.

Crassocheilus rostratus, Günther, *loc. cit.*

Crassocheilus barbatulus, Günther, *loc. cit.*

B. iii., D. $\frac{3}{7-8}$, P. 15, V. 9, A. $\frac{2}{5}$, C. 19, L. 1. 38-40.

There are several specimens of this fish from the lake in Kashmir; and, curiously enough, they show the links between Hamilton Buchanan's and Heckel's species. All have a pair of rostral barbels and minute mandibular ones (*C. barbatula*). Some have $5\frac{1}{2}$, some $4\frac{1}{2}$ rows between the lateral line and base of first dorsal ray. Others possess 3, $3\frac{1}{2}$, and $4\frac{1}{2}$ rows between the lateral line and base of ventral fin. The proportions, likewise, vary with age and other causes.

The localities this fish inhabits, and its mode of frequenting stones, very much resemble those of *Discognathus lamta*, Hamilton Buchanan, whilst its jaws are wide (not deep); and its under surface is similarly flattened, but it has no labial sucker.

17. BARBUS TOR. Plate III, fig. 4.

Cyprinus tor, Hamilton Buchanan, Fishes of Ganges, pp. 305, 388.

Barbus (*Labeobarbus*) *hamiltonii*, Gray and Hardwicke, Ind. Zool., pl.; Jerdon, Mad. Journ. Lit. and Sci., 1849, p. 311.

Barbus progeneius, M'Clell and, Ind. Cyp., pp. 270, 334, pl. lvi, f. 3; Cuv. and Val., xvi, p. 208.

Labeobarbus macrolepis, Heckel, Fisch. Kashmir, p. 60, pl. x, f. 2, Cuv. and Val., xvi, p. 209.

Labeobarbus tor, Bleeker, Cobit. et Cyp. Ceylon, in Nat. Verh. Holl. Maat. Haar., 1864, p. 10, f. 2. Day, Proc. Zool. Soc., 1867, p. 290; 1870, p. 372.

Barbus khudree, Sykes, T. Z. S. ii, p. 57.

Barbus tor, Cuv. and Val., xvi, p. 199.

Barbus (*Barbodes*) *tor*, Day, Proc. Zool. Soc., 1869, pp. 270, 334.

„ *mosal*, Günther, Cat. vii, p. 130.

„ *macrolepis*, Günther, Cat. vii, p. 131.

„ *longispinis*, Günther, Cat. vii, p. 132.

B. iii., D. $\frac{3}{9}$, P. 18, V. 9, A. $\frac{2}{5}$, C. 19, L. 1. 23-24, L. tr. $\frac{4}{4}$.

This fish, the Mahaseer of India, is too well known to need describing.

Habitat.—From Sind throughout India and Ceylon, and generally ascending mountain rivers for the purpose of breeding. Should such rivers be snow-fed, it deposits its ova in the side streams.

Before describing the Loaches, I will give my reasons why it appears to me that the genus *Diplophysa*, Kessler, may probably be a synonym of *Nemacheilus*.

It is said to consist of "elongated fishes, strongly compressed posteriorly," which we perceive in *Nemacheilus stoliczkæ* and *N. yarkandensis*; but in an equally elongated species *N. tenuis*, the free portion of the tail is not compressed, but is as wide as deep.

"The eyes are surrounded with a fold of skin forming a lid." This is also perceived in specimens amongst the species I have enumerated from Yárkand; and I have likewise noted that some of the other fishes from the same cold region have folds of skin more or less covering the eyes.

"Lips fleshy, the upper more or less denticulated, the inferior bilobed, and more or less papillated." I have figured the inferior surface of the head of all the Loaches; and although some, as *N. stoliczkæ* and *N. tenuis*, have the lips as described by Kessler, the *N. yarkandensis* has not, whilst the three certainly cannot be separated into distinct genera.

"Air-vessel in two parts, the anterior enclosed in a bony capsule, the posterior elongated and free in the abdominal cavity." This is the only portion of Kessler's definition not perceived in these fishes in which the air-vessel is enclosed in bone; and I cannot resist suggesting a re-examination of Western Turkestan specimens. It would be very remarkable were the *Nemacheili* found in Europe, in fact throughout Asia, even in the Oxus, to have their air-vessels enclosed in bone, whereas in the river Ili going to Lake Balkash, and the river Urdjar falling into Lake Ala (Ala-kul), they have the same organ partially free in the abdomen, as is seen in genus *Botia*. But granting Kessler's description to be accurate, I cannot think that such a fact alone would justify instituting a new genus for the reception of his species.

The reason for air-vessels being more or less enclosed in bone in some fishes is obscure; and I some time since adverted, in the 'Proceedings of the Zoological Society,' to the circumstance of such not being infrequent in Indian *Siluridæ*.

I found amongst the Indian genera of Siluroids of the fresh waters, or those which entered fresh waters, as follows:—

A.—Air-vessel, when present, free in the abdominal cavity—

1. *Rita*; 2. *Erethistes*; 3. *Pseudentropius*; 4. *Silurus*; 5. *Olyra*; 6. *Macrones*; 7. *Callichrous*; 8. *Wallago*; 9. *Arius*; 10. *Hemipimelodus*; ¹ 11. *Osteogeniosus*; 12. *Batrachocephalus*; 13. *Pangasius*; 14. *Plotosus*. Of these, five (Nos. 9, 10, 11, 12, and 14) are marine forms, entering fresh waters for predaceous purposes.

B.—Air vessel more or less enclosed in bone—

1. *Ailia*; 2. *Ailiichthys*; 3. *Sisor*; 4. *Bagarius*; 5. *Amblyceps*; 6. *Saccobranchus*; 7. *Silundia*; 8. *Eutropiichthys*; 9. *Gagata*; 10. *Nangra*; 11. *Pseudecheneis*; 12. *Exostoma*; 13. *Clarias*; 14. *Glyptosternum*. All of these are fresh water genera.

¹ *Hemipimelodus* appears to be *Arius* destitute of teeth on the palate.

These fourteen fresh water genera having the air-vessel enclosed in bone are divisible as follows :—

1.—Waters of plains—

(α.)—Large rivers. No suckers on the chest :—*Ailia*, *Ailichthys*, *Sisor*, *Bagarius*, *Silundia*, *Eutropichthys*, *Gagata*, *Nangra*.

(ε.)—Large rivers : descending to the sea. An accessory air-breathing apparatus :—*Clarias*.

(γ.)—Smaller rivers, tanks, &c. An accessory air-breathing sac :—*Saccobranchus*.

2.—Waters of the plains or hills—

No sucker on chest :—*Amblyceps*.

Sucker on chest :—*Glyptosternum*.

3.—Waters of hills—

Sucker on chest :—*Pseudecheneis*.

Chest adhesive :—*Exostoma*.

As we find genera with the air-vessel enclosed in bone decrease in number the further we are from Hindustan Proper, it is but natural to conclude that the necessity for this bony capsule is greater in India than in other tropical countries, and also that it is only useful for freshwater forms.

When we see that all fishes (except the *Nemacheili*) from Yarkand have the air-vessel free in the abdominal cavity, it stands to reason that heat or cold can scarcely be that which involves the necessity of this form of organization.

It appears most probable that the air vessel being more or less enclosed in bone is for the purpose of developing some function specially required or to an abnormal extent, and that whatever this may be it is most necessary in a mountain torrent, but unnecessary in a marine existence.

We find in fishes that the air-vessel has two distinct functions—

(1).—In the *Acanthopterygii*, where it is free in the abdominal cavity, its use is more or less a mechanical one, and by contracting or expanding the fish is enabled to maintain itself at a desired level.

(2).—In the *Physostomi* we find a very different formation, as in all there is a duct opening from the air-vessel into the upper portion of the alimentary canal. In some of these fishes the mechanical function appears to be alone served by it. In others, that of hearing seems to entirely supersede that for flotation, for being more or less enclosed in bone contraction and expansion would be impeded. These bones or auditory ossicles lead to the internal ear, and it is evident that in some way the air vessel serves for auditory purposes to an extent for which we, at present, are hardly in a position to account.

It is remarkable that *Siluroid* forms do not appear to thrive in cold climates. The *Cyprininæ* of this collection have all small scales, or are more or less destitute of any; whilst the Loaches of Yarkand and Tibet have none at all; neither have those recorded from the Oxus or the Jaxartes.

There is one characteristic of the hill Loaches which seems almost invariable: the pectoral fins are stiff at their bases, as if employed for adhesive purposes. I have observed the outer ray in some of the Loaches of the plains forming a distinct bony ray with an enlarged and flattened outer extremity: but this is used for the purpose of assisting them to dig into the sand, in which they will bury themselves with great rapidity on the approach of danger.

18. NEMACHEILUS STOLICZKÆ Plate V, fig. 2.

Cobitis stoliczkæ, Steindachner, Verh. z.-b., Ges. Wien., 1866, p. 793, t. xiv, f. 2.*Cobitis tenuicauda*, Steindachner *loc. cit.* p. 792, t. xvii., f. 3.*Nemacheilus stoliczkæ*, Günther, Cat. vii, p. 360.*Nemacheilus tenuicauda*, Günther, *loc. cit.*, p. 357.B. iii, D. $\frac{2}{7}$, P. 13, V. 8, A. $\frac{2}{5}$, C. 15.

Length of head 6, of caudal 6; height of body 8 in the total length. *Eyes*: diameter 8 in the length of head, 3 diameters from the end of snout, and 2 apart. *Snout* rounded, slightly projecting over the mouth. *Lips* rugose; and in some specimens from Yarkand the edges are fimbriated: lower lip with a lobe on either side, but the lower labial fold interrupted in the middle. The greatest width of the *head* equals its height, or its length excluding the snout. In some specimens the preorbital has a free lower edge. *Barbels* six; the maxillary ones reach beyond the hind edge of the eye; the rostral ones are shorter. *Fins*: the dorsal commences midway between the eye and the base of the caudal, it is one-third higher than its base is long, and equals the greatest depth of the body; its last ray is divided to its base; its upper edge is oblique, with a rounded anterior angle. Pectoral nearly as long as the head, and reaching rather above half-way to the ventral; the latter fin arises on a vertical line below the anterior dorsal rays, is almost as long as the pectoral, and reaches above half-way to the anal. Anal with a very narrow base: caudal slightly emarginate. Free portion of the tail from twice to two-and-a-half times as long as high at its base. *Scales*: absent. *Air-vessel*: in two portions, enclosed in bone. *Colours*: greyish along the back, becoming lighter beneath, marbled all over with dark green or black spots or bands. Dorsal, caudal, and sometimes outer pectoral rays barred.

In specimens from Sarikol the snout is rather more pointed than described above.

Hab.—Leh (11,518 feet); Snima; Lukong stream (14,130 feet); and Chagra (15,000 feet), all being waters directly or indirectly going to the Indus. Also Yarkand (3,923 feet) and Sarikol, where the waters go to the easterly or Yarkand River; and Aktásh (12,600 feet), which is on the Aksu or Oxus.

I have a specimen in my collection given me by Dr. Stoliczka: he procured it, along with those sent to Steindachner, from the Tso-Morari in Rupshu (Tibet), on his first visit to that country.

19. NEMACHEILUS YARKANDENSIS. Plate V, fig. 3.

Day, Proc. Zool. Soc., 1876, page 796.

B. iii, D. $\frac{2}{7}$, P. 17, V. 8, A. $\frac{2}{5}$, C. 15.

Length of head $4\frac{1}{3}$, of caudal 6, height of body $6\frac{3}{4}$ in the total length. *Eyes*: diameter 6 to 7 in the length of the head, $2\frac{1}{2}$ diameters from the end of snout, and 2 to 3 apart. *Snout*: rather elevated in the adult. Upper surface of the *head* nearly flat; its greatest width equals its height or its length excluding the snout. *Mouth* inferior, horseshoe-shaped; lips smooth, lower labial fold interrupted in the middle and destitute of lobes. *Barbels* six; the maxillary ones reach (in adults) the angle of the preopercle. *Fins*: the dorsal commences

midway between the front edge of the eye and the base of the caudal fin; its upper edge is straight and oblique; its height rather exceeds that of the body below it, and is one-fourth more than the extent of its base. Pectoral as long as the head excluding the snout, and reaching two-thirds of the distance to the ventral. Ventral commences below the first dorsal ray, is shorter than the pectoral, and reaches two-thirds of the distance to the anal. Anal twice as high as wide at its base. Caudal emarginate, its outer rays being a little produced. Free portion of the *tail* at its commencement nearly equals its length in the adult, but is less in the young. *Scales* absent. *Air-vessel* in two portions, enclosed in bone. *Colours*: greyish, having in some specimens numerous fine blackish or dark spots on the body. In some there is a silvery lateral band.

Hab.—Yárkand, Pasrobat, Yangihissár, and Káshghar, all from waters in connection with the Yárkand and Yangihissár or Great Easterly River.

20. NEMACHEILUS TENUIS. Plate V, fig. 4.

Day, Proc. Zool. Soc., 1876, page 796.

B. iii, D. $\frac{2}{8-9}$, P. 13, V. 8, A. $\frac{2}{5}$, C. 17.

Length of head $5\frac{1}{2}$ to $5\frac{1}{2}$, of caudal $7\frac{1}{2}$, height of body 9 to 10 in the total length. *Eyes*: diameter $5\frac{1}{2}$ in the length of head, $2\frac{1}{4}$ diameters from the end of snout, and 1 apart. *Snout* rather compressed and overhanging the mouth; the greatest width of the *head* equals its height or its length excluding the snout. In some specimens the lower edge of the preorbital is free. *Lips* thickened and fimbriated in the adult; lower labial fold interrupted in the middle, and rather lobed on either side. *Barbels* six; the outer rostral pair extend to below the hind edge of the eye, the maxillary ones to the opercle in the adult. *Fins*: dorsal commences midway between the end of the snout and the base of the caudal fin; its upper edge is slightly concave, with a rounded upper angle; it is rather more than one-half higher than the extent of its base or than the body below it. Pectoral nearly as long as the head, and reaches rather above half-way to the ventral, which latter commences under the third dorsal ray; is as long as the pectoral, and reaches the base of the anal. Anal twice as high as wide at its base. Caudal slightly emarginate. Free portion of the tail one-third as high at its base as it is long, while its breadth equals its height. *Scales* absent. *Air-vessel* in two portions, enclosed in bone. *Colours*: yellowish white, the surface and sides sometimes with dark blotches and spots: dorsal and caudal fins with dull spots.

This fish is allied to *N. ladacensis*, Günther, but is distinguished by a more elongated body and longer barbels, &c.

Hab. Aktásh (12,600 feet elevation), whence the waters pass to the Oxus; and Yangihissár (4,320 feet elevation), where the rivers go to the Yárkand River.

21. NEMACHEILUS LADACENSIS. Plate IV, fig. 4.

Nemacheilus ladacensis, Günther, Cat. vii, p. 356.

B. iii., D. $\frac{2}{8}$, P. 13, V. 9, A. $\frac{2}{6}$, C. 19.

Length of head 5, of caudal $5\frac{3}{4}$; height of body $5\frac{1}{2}$ in the total length. *Eyes*: diameter 5 to $5\frac{1}{2}$ in the length of head, $2\frac{1}{2}$ diameters from end of snout, and 2 apart. Greatest width

of *head* equals its height or its length excluding the snout. *Lips* moderately thick and rugose; lower labial fold interrupted in the middle. *Barbels* 6; the maxillary ones scarcely reach to below the front edge of the eye, the longest rostral ones to below the front nostril. *Fins*: dorsal commences midway between the front edge of the eye and the base of the caudal fin: it is as high as the body below it and half higher than its base is long; its upper anterior corner rounded. Pectoral as long as the head behind the angle of the mouth, and reaching nearly to the ventral, which latter fin arises below the commencement of the dorsal fin: it is shorter than the pectoral, but extends to the base of the anal. Anal twice as high as long, and reaches above half-way to the base of the caudal which is emarginate. Free portion of the tail twice as long as high at its base. *Scales* absent. *Colours*: of a light fawn, with sixteen or eighteen interrupted darker and sinuous bands passing from the back down the sides; a silvery lateral band. Dorsal and caudal finely spotted in lines: a darkish band on pectoral, ventral and anal.

Hab. Gnari Khorsum, Tibet. The specimen described is the largest of two obtained by Messrs. von Schlagintweit, and deposited in the Indian Museum. The size of the British Museum specimen, and the broken state of its caudal fin, must be accepted as the reason why my proportion of the free portion of the tail does not agree with Dr. Günther's (nearly $\frac{1}{4}$); whilst I find the caudal fin "emarginate," and not "rounded."

22. NEMACHEILUS GRACILIS. Plate IV, fig. 5.

Day, Proc. Zool. Soc., 1876, p. 798.

B. iii, D. $\frac{2}{7}$, P. 13, V. 8, A. $\frac{2}{6}$, C. 17.

Length of head $5\frac{1}{2}$, of caudal $6\frac{1}{3}$, height of body $6\frac{1}{3}$; in the total length. *Eyes*: diameter 11 in length of head, 4 diameters from end of snout, and $2\frac{1}{2}$ apart. *Snout* overhanging the mouth. The greatest width of the head equals its height or its length excluding the snout. *Lips* thickened; lower labial fold interrupted in the middle and rather lobed on either side. *Barbels* six; the maxillary ones nearly twice as long as the eye; the external rostral ones reach the hind nostril; the other pair are shorter. *Fins*: dorsal commences midway between the eye and vertical border of the preopercle; its upper edge is nearly straight; it is not quite so high as the body below it, and one-fourth less than the extent of its base. Pectoral as long as the head behind the angle of the mouth; it reaches rather above half-way to the base of the ventral, which latter fin arises somewhat in advance of the commencement of the dorsal; it is of about the same length as the pectoral, and extends half-way to the anal. Anal twice as high as wide at its base: it reaches, when laid flat, a little more than half-way to the base of the caudal, which is slightly emarginate. Free portion of the tail half as high at its base as it is long. *Scales* absent. *Colours* brownish along the back, becoming yellowish beneath: dorsal and caudal with dull spots.

Hab. Basgo, on the head waters of the Indus.

23. NEMACHEILUS MARMORATUS. Plate V, fig. 1.

Cobitis marmorata, Heckel, Fische Kasch., p. 76, t. xii., figs. 1 and 2: Hügel, Kaschm. iv., p. 380.

Cobitis vittata, Heckel, *loc. cit.* p. 80, t. xii., figs. 3 and 4; Hügel, *loc. cit.* p. 382.

Nemacheilus marmoratus, Günther, Cat. vii., p. 356; Day, Proc. Zool. Soc., 1876, p. 798.

B. iii, D. $\frac{2}{7}$, P. 11, V. 7, A. $\frac{2}{5}$, C. 17.

Length of head $4\frac{3}{4}$ to 5, of caudal 7, height of body 7 in the total length. *Eyes*: diameter 5 in length of head, 2 diameters from end of snout, and $1\frac{1}{2}$ apart. *Snout* somewhat pointed; and in some the preorbital is slightly projecting, *Lips* wrinkled; the lower labial fold interrupted. The greatest width of the head equals its height or its length excluding the snout. *Barbels*: the maxillary ones reach to below the hind edge of the eye; the rostral ones are nearly as long, *Fins*: dorsal commences midway between the end of the snout and the base of the caudal; its upper edge is nearly straight, oblique, and with rounded angles; its height rather exceeds that of the body below it; and it is nearly twice as high as its base is long. Pectoral as long as the head excluding the snout, and extending half-way to the ventral. Ventral one-third shorter than the pectoral, and reaching half-way to the anal. Anal twice as high as long at its base. Caudal cut square, with rounded angles or slightly emarginate. Free portion of the tail from one-and-a-half to twice as long as high at its base. *Scales* absent. *Colours* marbled or irregularly blotched and spotted with brown; fins also more or less spotted.

Hab. Kashmir Lake.

24. NEMACHEILUS RUPICOLA.

Schistura rupicola, M'Clelland. Journ. A. Soc. Bengal, vii., pl. lv, fig. 3, and Ind. Cypr., p. 309, pl. lvii., f. 3.

The Kashmir species are almost or quite destitute of scales, and otherwise agree with M'Clelland's fish.

25. NEMACHEILUS MICROPS.¹

Cobitis microps, Steindachner, Verh. z.-b. Ges. Wien., 1866, p. 794, t. xiii., f. 3.

Nemacheilus microps, Günther, Cat. vii., p. 357.

This species is entirely destitute of scales. The head is as wide as it is long. It was obtained by Dr. Stoliczka in Tibet on his first journey, but no specimens exist amongst the Yárkand collection.

¹ *Oreias Dabryi*, Sauvage, Rev. et Mag. Zool., 1874, p. 3, is closely allied to this species.

If we examine the localities whence the fishes which form this collection were procured, omitting the Murree and Kashmir examples, we find as follows:—

| Name of species. | Head waters of Indus. | Yárkand river, or its branches. | Oxus, or its tributaries. |
|--|-----------------------|---------------------------------|---------------------------|
| <i>Exostoma stoliczka</i> | 1 | ... | ... |
| <i>Oreinus sinuatus</i> | 1 | ... | ... |
| <i>Schizothorax esocinus</i> | 1 | ... | ... |
| ————— <i>chrysochlorus</i> | ... | 1 | ... |
| ————— <i>intermedius</i> | ... | 1 | 1 |
| ————— <i>irregularis</i> | ... | 1 | ... |
| <i>Ptychobarbus conirostris</i> | 1 | ... | ... |
| ————— <i>laticeps</i> | ... | 1 | ... |
| ————— <i>longiceps</i> | ... | 1 | ... |
| <i>Schizopygopsis stoliczka</i> | 1 | ... | 1 |
| <i>Diptychus maculatus</i> | 1 | 1 | ... |
| <i>Nemacheilus stoliczka</i> | 1 | 1 | 1 |
| ————— <i>gracilis</i> | 1 | ... | ... |
| ————— <i>yarkandensis</i> | ... | 1 | ... |
| ————— <i>tenuis</i> | ... | 1 | 1 |
| Total | 8 | 9 | 4 |

Thus, we have eight species from the head-waters of the Indus, two of which extend to the great easterly, or Yárkand, River of Eastern Turkestan, and one to the Oxus of Western Turkestan; nine species from the Yárkand River, two common to the Indus and three to the Oxus; and four species from the Oxus, three of which are also found in the Yárkand River, and one in the head waters of the Indus.

If these species are examined in accordance with the districts traversed by this Mission and mapped out by Mr. Hume, we obtain the following results:—

(1st).—From the hilly region between Murree and the Zoji-la Pass, there exists one species of *Schizothorax* showing an affinity to the Turkestan fauna: one *Oreinus*, a Himalayan genus: and two species of *Nemacheilus*, a genus common to Turkestan and Hindustan.

(2nd).—From Zoji-la to the head of the Pankong there are;—one Siluroid, *Exostoma*, evidently a Himalayan and hilly form. Of carps, the Himalayan *Oreinus* and four genera which may be considered as common to Turkestan, and mostly to the upper hilly regions, viz., *Schizothorax*, *Schizopygopsis*, *Ptychobarbus* and *Diptychus*; lastly, a *Nemacheilus*, an almost universally distributed genus.

(3rd).—From the plains of Yárkand, two species of *Schizothorax* and two of *Ptychobarbus*, evidently the most typical forms of the fishes in these elevated regions; the genus *Nemacheilus* is likewise represented,

(4th).—From the west of Yárkand to the Pámir *Schizothorax*, *Schizopygopsis* and *Diptychus*, all forms found in Turkestan or adjacent regions, and likewise *Nemacheilus* were obtained.

The foregoing species constitute the fish-collection made in the cold and inhospitable regions traversed by the Mission; and they are of interest for the purpose of ascertaining what are the chief characteristics of the fish-fauna, and what relationship it bears to those of contiguous Asiatic regions, so far as such have been ascertained.

In this inquiry it will be necessary to take a survey of the fishes of Afghanistan, Western Turkestan, and Hindustan, before proceeding further respecting those of Tibet and Yárkand or Eastern Turkestan.

Most of our knowledge of the fishes of Afghanistan is due to the labours of Griffith, who remarked:—"The characteristic forms of Afghan fish are doubtless the small-scaled *Barbi* and *Oreini*; and these far exceed the others in number The fish are as distinct from the Indian forms as the plants are By characteristic I do not mean that these forms are limited to Afghanistan, because they occur perhaps to an equal extent in the Himalayas, to the streams of which those of Afghanistan approximate more or less in the common features of rapids and bouldery beds."

Having crossed the high range of mountains separating Afghanistan from the plains of Western Turkestan, he found "a great change in the fish to occur, and *Salmonidæ*¹ seem to take the precedence of the *Cyprinidæ*. A species of trout abounds in the Bamean River and up its small tributaries, derived from the Koh-i-Baba, to an altitude of about 11,000 feet. A species of *Barbus* with small scales is likewise common in the Bamean River"² (Cal. Journ. Nat., Hist., ii. p. 565).

He observes that Indian species were in the majority in the Cabul river (a tributary of the Indus) at Peshawur; and in accordance with the facility or the reverse of access from the plains did he find a predominance of Indian or Afghan forms.³

The nature of the fishes of Afghanistan appears to be much as follows:—Absence of Acanthopterygian or spiny-rayed families, except the spineless and widely distributed *Ophiocephalus gachua*, Ham. Buch., and the spiny eel, *Mastacembelus armatus*, Lacép., so common in the East from the plains to the summits of mountains. Few Siluroids, but perhaps a *Callichorus* and *Amblyceps*. Numerous Cyprinoids which appear to belong to the following genera—*Oreinus*, *Schizothorax*, *Bungia*, from near Herat, *Barilius*, and a Loach (? *Nemacheilus*), perhaps *Discognathus* and *Barbus*.

The fullest account we possess of the fishes of Western Turkestan is that lately given by Kessler, from which I have extracted the following:—

ACANTHOPTERYGII. *Perca fluviatilis*, Linn., obtained exclusively from the Jaxartes and some of its tributaries. *P. schrenckii*, Kess., from Lake Balkash. *Lucioperca sandra*, Cuv., from the Jaxartes. *Cottus spinulosus*, Kess., very rare in Turkestan, two specimens from Khojend.

None of these spiny-rayed fishes were captured at so south a latitude as Káshghar. Out of the four species three came from the Jaxartes or its tributaries, the other from Lake Balkash.

¹ This remark appears to have been a little too strong, as he only found one species of *Salmo*; probably it was very abundant.

² The stuffed type presented to the British Museum from the Indian Museum seems to have been lost or destroyed.

³ Griffith states that the Cabul River at Jellalabad presents us with two or three small-scaled *Barbi* (? *Schizothorax*) and *Oreini* together with certain tropical forms, as the Mahasir (*Barbus*) and a *Silurus* very like, if not identical with, the Poftah (? *Silurus afgana*). Also the same river at Lalpur possesses a fish, I believe, identical with the Nepoora of Assam (*Labeo*) and a *Gonorhynchus* (= *Discognathus*). Griffith also mentions a Loach-like *Silurus* from near Jubraiz (? *Amblyceps*).

SILURIDÆ. *Siluris glanis*, Linn. Generally spread throughout Western Turkestan, having been received from the Jaxartes, Oxus, and Sarekshan or Tarafshan Rivers.

CYPRINIDÆ. *Cyprinus carpio*, Linn., from the Jaxartes, Oxus, Sarekshan Rivers. *Barbus conocephalus*, Kess., from Sarekshan. *B. platyrostris*, Kess., from the River Aksu falling into Lake Balkash. *B. lacertoides*, Kess., from Jaxartes and its tributaries. *B. brachycephalus*, Kess., from Jaxartes and Oxus. *Schizothorax aksaiensis*, from the River Aksai. *S. fedtschenkoi*, Kess., *S. affinis*, Kess., and *S. eurystomus*, Kess., from the Sarekshan River. *S. orientalis*, Kess., from a lake on the Alatau Mountains, the waters on the Western Turkestan side of which drain to Lake Balkash. *Diptychus severzowi*, Kess., Aksai and Ottuk Rivers to 10,000 feet. *D. dybowskii*, Kess., River Aksu. *Gobio fluviatilis*, Cuv., widely distributed in Western Turkestan, specimens received from near the towns of Tashkend, Khojend, Djisak, and from the Ak Daria. *Abramis brama*, Linn., Jaxartes and its tributaries. *A. sapa*, Pallas, rare, from the Jaxartes. *Acanthobrama kuschakewitschi*, Kess., Jaxartes. *Pelecus cultratus*, Linn., Sea of Aral. *Abramis chalcoides*, Güld., rather rare, obtained in the Ak Daria and Durman Kul. *A. iblioides*, Kess., creeks near Janikurjan. *A. fasciatus*, Nord., Sarekshan. *A. tæniatus*, Kess., Jaxartes. *Aspius rapax*, Pallas, Jaxartes and its tributaries. *A. esocinus*, Kess., Jaxartes and Oxus. *Leuciscus erythrophthalmus*, Linn., Jaxartes. *L. squaliusculus*, Kess., from near Khojend on the Jaxartes and Janikurjan. *L. rutilus*, Linn., Jaxartes and Aigus Lake.

COBITIDINÆ. *Cobitis longicauda*, Kess. (scaled), one specimen from the Jaxartes. *C. uranoscopus*, Kess., from near Magian, Tashkend, Hhodjaduk, and Lake Iskander, the waters of which appear to drain to the Sarekshan River. *C. dorsalis*, Kess., creeks near Janikurjan. *C. elegans*, Kess., and *C. tænia*, Kess., river near Tashkend, a tributary of the Jaxartes. *Diplophysa strauchii*, Kess., river Ili, falling into Lake Balkash. *D. labiata*, Kess., River Urdjar, falling into Lake Ala.

SALMONIDÆ. *Salmo oxianus*, Kess., river Darant, falling into the Kisil-su, one of the upper tributaries of the Oxus.

ESOCIDÆ. *Esox lucius*, Linn., Jaxartes and its tributaries.

CHONDROPTERYGII. *Acipenser schipa*, Lovetsky, Jaxartes, Casalius River. *Scaphirhynchus fedtschenkoi*, Kess., Oxus.

The foregoing fishes of Western Turkestan¹ mainly consist of—

(1st).—Those descending from the north or spreading from the east or west, such as *Perca*, *Lucioperca*, *Cottus*, *Gobio*, *Abramis*, *Acanthobrama*, *Pelecus*, *Alburnus*, *Aspius*, *Squalius*, *Leuciscus*, *Acipenser*, and *Scaphirhynchus*.

(2nd).—Those common to Afghanistan and Yárkand, as *Schizothorax*, *Barbus*, Loaches (? genus).

(3rd).—Those found also in Yárkand, as *Schizothorax* and *Diptychus*.

(4th).—*Silurus*, (which will be alluded to).

Lastly, *Salmo*, on the slopes of the mountains where the rivers descend to the Oxus.

The existence of one of the *Salmonidæ*, termed *Salmo orientalis* by M'Clelland, was well known to Dr. Stoliczka; and a special object of his search (as he informed me previous to starting) would be to try and ascertain its distribution. Griffith found this fish "in the Bamean River, a stream that falls from the northern declivities of the Hindoo Koosh into the Oxus."

¹ I have to thank Mr. F. Carl Craemers for kindly translating some Russian localities, which I should not otherwise have been able to give.

Kessler does not record any of this family from the Jaxartes, or, in fact, from the rivers immediately descending from the Tian Shan or the Alatau Mountains. We are, therefore, left to surmise that in the hills whence these fishes were taken is the abrupt termination of members of the family *Salmonidæ*, which does not possess a solitary representative in Hindustan, except the *S. levenensis* (introduced on the Nilgiris in Madras).

If we now take a short review of the *Fresh Water Fishes of India* we find much as follows :—

ACANTHOPTERYGII.

Genera *Ambassis*, *Badis*, *Nandus*, *Pristolepis*, *Sciæna*, *Gobius* and some allied genera, *Rhynchobdella*, *Mugil*, *Anabas*, *Polyacanthus*, *Osphromenus*, *Trichogaster*, *Etroplus* exist in India, but are absent from the fresh waters of Afghanistan, Turkestan, and Yárkand. Whether existing only in large rivers or distributed more generally over India, none pass the boundary of the Himalayas.

Mastacembelus and *Ophiocephalus* are found in India and in Afghanistan; both ascend for some height the Himalayas and other hill ranges.

PHYSOSTOMI.

SILURIDÆ. Genera *Erethistes*, *Macrones*, *Rita*, *Pangasius*, *Pseudeutropius*, *Wallago*, *Olyra*, *Chaca*, *Clarias*, *Saccobranchus*, *Silundia*, *Ailia*, *Ailiichthys*, *Eutropiichthys*, *Sisor*, *Gagata*, *Nangra*, *Bagarius*, *Pseudecheneis*, *Glyptosternum* exist in India, but not in Afganistan, Turkestan or Yárkand.

Callichrous and *Amblyceps*, which are found in India, appear to be present in Afganistan, and the former also in Kashmir.

Exostoma is found along the Himalayas; *Silurus* in Turkestan and India.

CYPRINODONTIDÆ. *Cyprinodon* and *Haplocheilus* are found in India.

CYPRINIDÆ. Genera *Homaloptera*, *Psilorhynchus*, *Cirrhina*, *Osteochelus*, *Scaphiodon*, *Semiplotus*, *Catla*, *Amblypharyngodon*, *Nuria*, *Rashora*, *Aspidoparia*, *Rohtee*, *Danio*, *Perilampus*, *Chela*, and various genera of *Cobitidinae* exist in India.

Discognathus, *Labeo*, and *Barilius* are common to India and Afghanistan, but are evidently Indian forms.

Oreinus, *Schizothorax*, and *Barbus*, are found in India, also in Afghanistan, and the two last in Turkestan, whilst *Schizothorax* is common in Yárkand. *Cobitis* or *Nemacheilus* seem to extend everywhere.

CLUPEIDÆ and NOTOPTERIDÆ. Of the genera belonging to these families, and which exist in the fresh waters of India, none go beyond the base of the Himalayas.

The *Fishes of Yárkand*¹ or *Eastern Turkestan* consist of species of the following genera :—*Schizothorax*, found also in Afghanistan and Western Turkestan; one species on the slopes

¹ I here omit the genera *Exostoma* from the Himalayas, and *Oreinus* from the Himalayas and Afghanistan.

of the Himalayas, and sometimes even descending to the plains. *Diptychus*, Tibet, Yárkand and Western Turkestan. *Schizopygopsis*, Tibet and Yárkand. *Ptychobarbus*, Tibet and Yárkand. The remainder are Loaches.

Diptychus Dybowskii, Kess., would almost seem to be a *Schizopygopsis* with an articulated dorsal ray and a pair of maxillary barbels. Perhaps several of these hill-genera will, at some future date, be properly amalgamated, as has been done with the low-country Barbels (*Barbus*).

An examination of the genera of spiny-rayed or Acanthopterygian fishes clearly shows that as we proceed inland in India they diminish; at the Himalayas they cease. Two Indian species¹ only have been observed to exist in Afghanistan; and they are amongst the most widely distributed of their respective genera. Neither of these extends in the north-east, either to Western Turkestan or Yárkand. In Western Turkestan, it is true, three genera of this order are represented; but they have evidently extended southwards. Yárkand and Tibet appear to be unsuited for this order of fishes: and thence none have been brought.

The Physostomi include all the Yárkand and Tibet fishes. Among Siluroids the Indian genera *Callichrous* and ? *Amblyceps* have been doubtfully recorded from Afghanistan; but neither have spread to Western Turkestan, where, however, the *Silurus glanis* is found, evidently a wanderer from its more northern home.

It is clear that in India there is a gradual diminution of Siluroids as we proceed inland until we arrive at the Himalayas. On the slopes of these mountains we at first obtain a few peculiar genera and species organized for a mountain-torrent life; but as we rise, eventually (as was the case in this Mission), an elevation is attained which, taken in connection with the latitude and paucity of food, seems to be beyond the limit of the Indian Siluroids.

The Siluroids along the slopes of the Himalayas appear to be mostly confined to the following:—A few, as *Macrones* and *Callichrous*, ascend a short distance, which may be considered accidental. *Pseudecheneis* is a more distinct hill-form, possessing a sucker formed of transverse folds between its pectorals on the chest, and by the aid of which it prevents itself being carried away by the torrents. *Glyptosternum* has also an adhesive sucker, but of longitudinal folds, and likewise placed on the chest. These fishes, however, appear to be more intended for rapid rivers in the plains, but some ascend the slopes of the Himalayas. I have taken *large specimens* from the rivers at the base of the hills in which the suckers were scarcely visible: whether they had outgrown them, or, owing to the suckers not having been primarily well developed, they had been unable to maintain their footing in the hill-streams, of course, one cannot decide. *Amblyceps* is a Loach-like form found in the waters of the plains and also of the hills; it is abundant near Kangra. *Exostoma*, an example of which exists in the Yárkand-Mission collection, is also a remarkable form. It has a broad and depressed head and chest, the latter forming a species of sucker to enable it to sustain a mountain-torrent life.

This fish (*Exostoma stoliczkæ*) belongs to a genus which has only been recorded from hilly regions, neither extending to the waters of the comparatively level plateaus of the high lands, nor descending any distance towards the plains. The following six species are known:—(1) *E. stoliczkæ*, from the head-waters of the Indus; (2) *E. blythii*, from near Darjeeling, where the waters descend to the Ganges; (3) *E. labiatum*, from the Mishmi Mountains and Eastern Assam; (4) *E. andersonii*, from near Bhamo on the confines of China; (5) *E. davidi*,

¹ *Ophiocephalus gachua* and *Mastacembelus armatus*.

from the most easterly portion of Tibet near the head waters of the Yang-se-kiang; (6) *E. berdmorei*, from Tenasserim.

The distribution of the foregoing six species of this genus is interesting, because it is suggestive of whether, at some remote period, the Himalayan range, the mountains between Tibet and China, and the spur or continuation southwards through Burma and Siam, may not have been connected one with another.

Whilst adverting to this point, I would mention another circumstance: the only Siluroid stated to be found in Western Turkestan is the *Silurus glanis*, Linn. Three other species of the same genus have been captured on the hill-ranges of India; and their distribution somewhat accords with that of *Exostoma*—

- (1).—*Silurus cochinchinensis*, Cuv. & Val. = *Silurichthys berdmorei*, Blyth, and
- (2).—*Silurus wynaadensis*, Day. These fishes, found in hills up to about 2,500 feet, have been obtained in the Western Ghâts, Akyab Hills, Tenasserim and Cochin China. They would appear to be restricted to those mountains which are not far removed from the seacoast. How it is that several species of fishes are common to Malabar and Siam, or the countries contiguous to it, whilst they are entirely absent from the intermediate districts of India, is a question which I do not propose entering upon.
- (3).—*S. afghana*, Günther, from Afghanistan, is identical with *S. dukai*, Day, from Darjeeling.

Cyprinidæ form the entire collection of the Yarkand Mission, after its arrival beyond the upper waters of the Indus. If we examine the members of this family found on the Himalayas in the same manner as we have the Siluroids, we find as follows:—*Discognathus*, so easily recognizable by the sucker on the lower lip, is found some distance up the mountains, but is rare above 5,000 feet. *Oreinus*, with its small scales, broad mouth, and likewise a sucker behind the lower jaw, becomes more and more common the higher we ascend. The Expedition obtained one species at Leh, in the Upper Indus; and it has been found as a genus extending from Afghanistan along the Himalayan Range, and near Bhamo by the last Yunnan Mission, or the same district as the Siluroid genera *Exostoma* and *Silurus*. It appears to essentially prefer the sides of hills and impetuous torrents.

Some of the stronger *Labeos*, Barbels (*Barbus*), and a *Barilius* are found here and there on the slopes and in the side streams of the Himalayas up to very considerable heights. They, however, are Indian forms which, if able to do so, appear to migrate during the breeding-season to the mountains to deposit their ova in the side streams which are replenished by snow-water. Here the fry are often compelled to remain until the succeeding year's rains swell the waters, washing food into their retreats to enable them to grow, or else to permit them to descend to the plains.

Once near the summit of these mountains, and beyond districts where adhesive suckers are a necessity for moderate-sized fishes to possess to prevent their being washed away, we come upon genera as rare in the plains of India as are the Indian forms at the summit of the Himalayas.

Kashmir is a locality traversed by this Mission, a hilly Himalayan district, and one to which it is necessary to refer. In Hügel and Heckel's "Fische aus Kaschmir" we find the following species recorded:—

Oreinus plagiotomus, Heckel; *O. sinuatus*, Heck.; *Schizothorax curvifrons*, Heck.;
S. longipinnis Heck.; *S. niger*, Heck.; *S. nasus*, Heck.; *S. huegelii*, Heck.;

S. micropogon, Heck.; *S. planifrons*, Heck.; *S. esocinus*, Heck.; *Cirrhhina gohama*, Ham. Buch.; *Barbus tor*, Ham. Buch.; *Labeo varicorhinus*, Heck.; *Nemacheilus marmoratus*, Heck.; *Callichrous pabda*, Ham. Buch.

These fishes demonstrate relationship with three districts :—

Schizothorax with Afghanistan and East and West Turkestan;

Oreinus with the slopes of the Himalayas in their whole extent;

Cirrhhina, *Barbus*, and *Callichrous* with the neighbouring fauna of Hindustan.

Having examined what are the ingredient parts of the fish fauna of Western Turkestan, Afghanistan, Hindustan, Yárkand or Eastern Turkestan, Tibet, and Kashmir, it will be interesting to endeavour to discover if these localities are possessed of any indigenous forms, and, if so, how far they extend into contiguous countries.

I do not propose inquiring into whether the great desert region of Central Asia can or cannot be included in one Tartarian subregion; but, as the zoology of this portion of the globe is at present rather obscure, I think it will be more useful to limit oneself strictly to ascertained facts.

Sir D. Forsyth's Mission has led naturalists into the fringe of an ichthyological region of which Yárkand may be the centre; certainly it is richer in forms of *Schizothoracinae* than Western Turkestan appears to be.

In the cold and hilly districts of Tibet and Yárkand we observe an absence of spiny-rayed and Siluroid fishes; whilst amongst Carps we see the genera *Schizothorax*, *Ptychobarbus*, *Schizopygopsis*, and *Diptychus*—fishes belonging to a peculiar division *Schizothoracinae*, (or Hill-Barbels of M'Clelland), which may be thus defined :—

Carps more or less covered with minute scales, or destitute of any. A membranous sac or slit anterior to the anal fin, which is laterally bounded by a row of vertically placed scales, like eave-tiles, and which are continued along the base of the anal fin.

The fishes composing this are mostly of an elongated form, and are divisible into :—

a. Those with transverse mouths, as *Oreinus*, *Ptychobarbus*, *Schizopygopsis*, *Diptychus*.

b. Those with compressed mouths, as *Schizothorax*.

The genus *Oreinus* is spread from the Helmund River and Jellalabad in Afghanistan, along the whole Himalayan and contiguous ranges of hills to at least the confines of China. So far as I know, these fishes appear to be strictly residents of rivers in hilly regions, neither descending far into those of the plains nor found on the level plateaus on the summits of the mountains. This accounts for their absence from the Yárkand collection; and from the foregoing extracts it appears probable that they are not found to the north of the Oxus. This genus appears to be on the outskirts of the rest of its group; and its mouth armed with a sucker, to resist its being washed away, makes it well able to sustain a mountain-torrent life.

The other genera are more or less spread in the following districts. From the Helmund River and the eastern portion of Afghanistan, the upper part of the Oxus, and the eastern portion of Western Turkestan, the Tian Shan or Celestial Mountains, and also the Alatau mountains more to the south, they extend along the Himalayan region, certainly as far as the most easterly part of Assam.

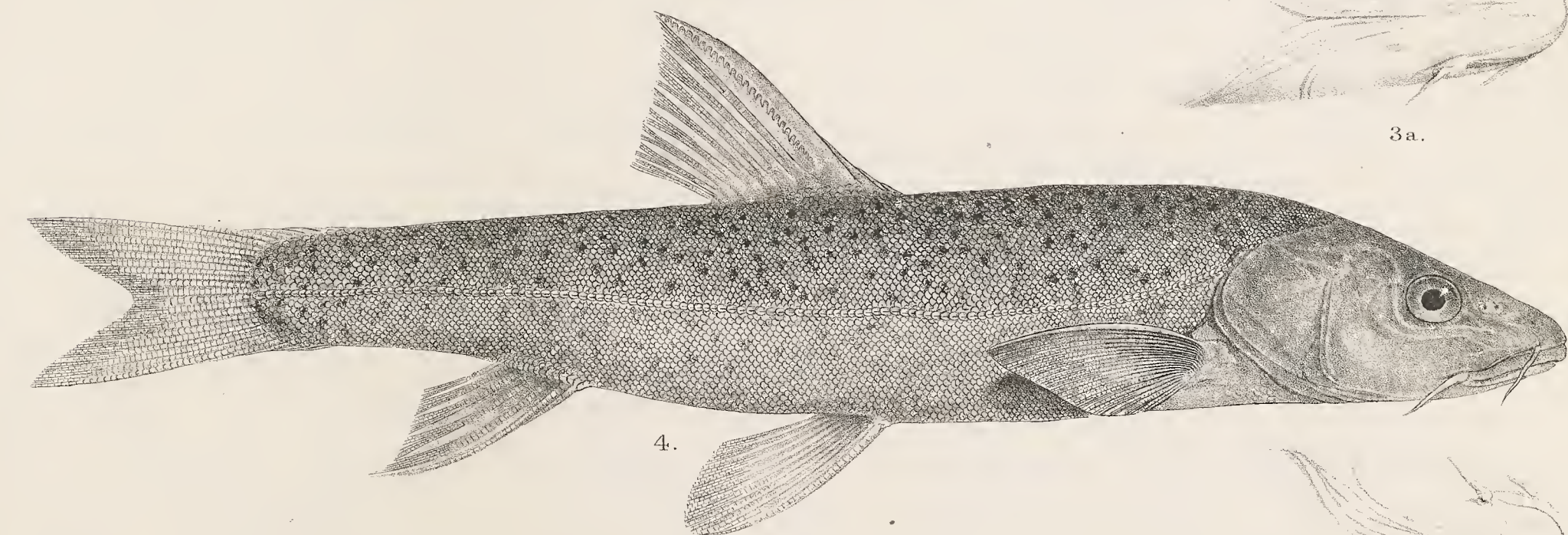
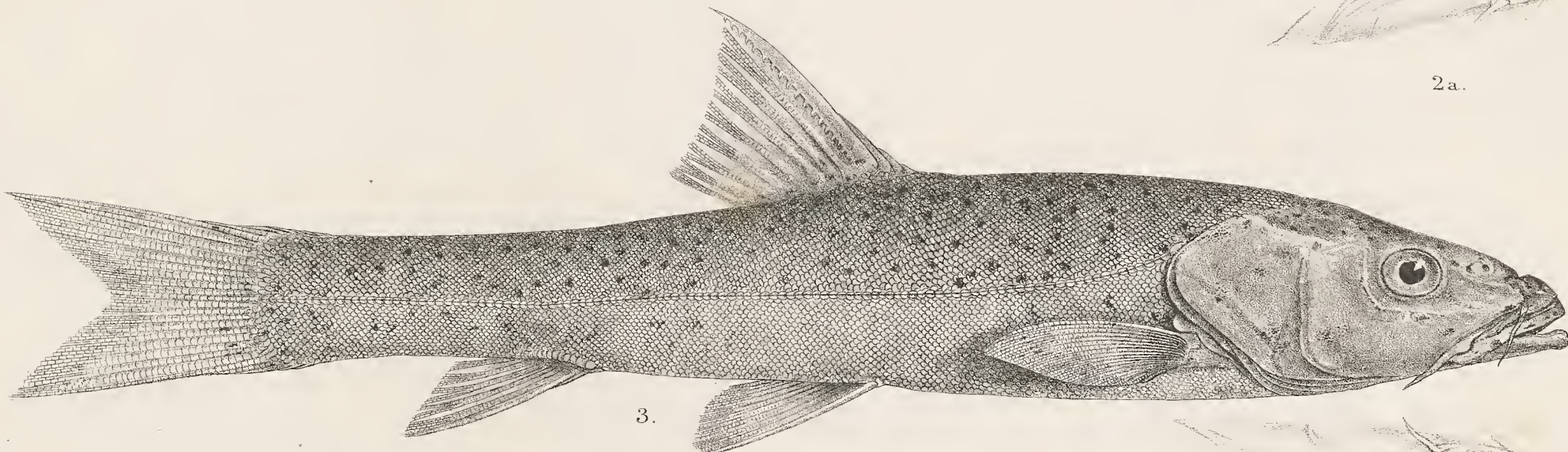
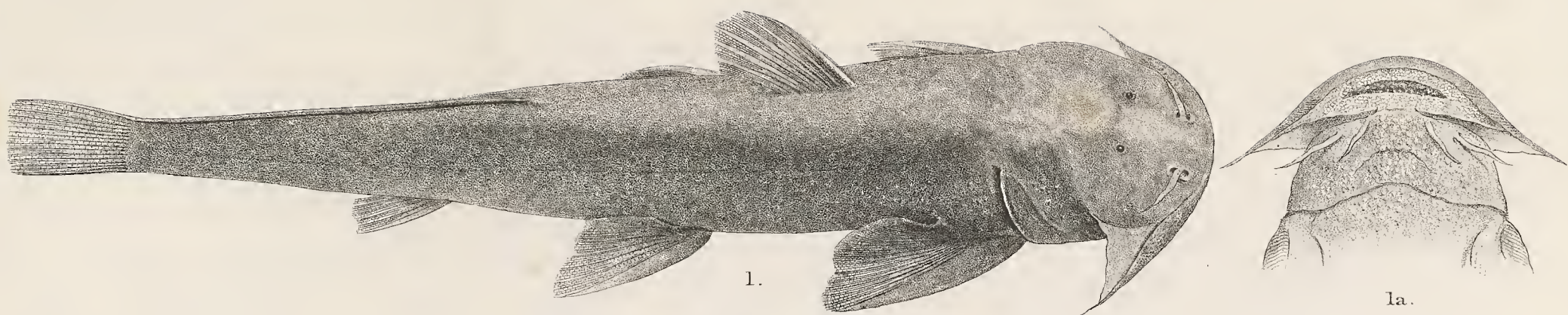
These fishes (*Schizothoracinae*) are confined to cold regions, as a rule, or at least to localities possessing snow-fed rivers, many of which rivers end in lakes and do not go to the sea.

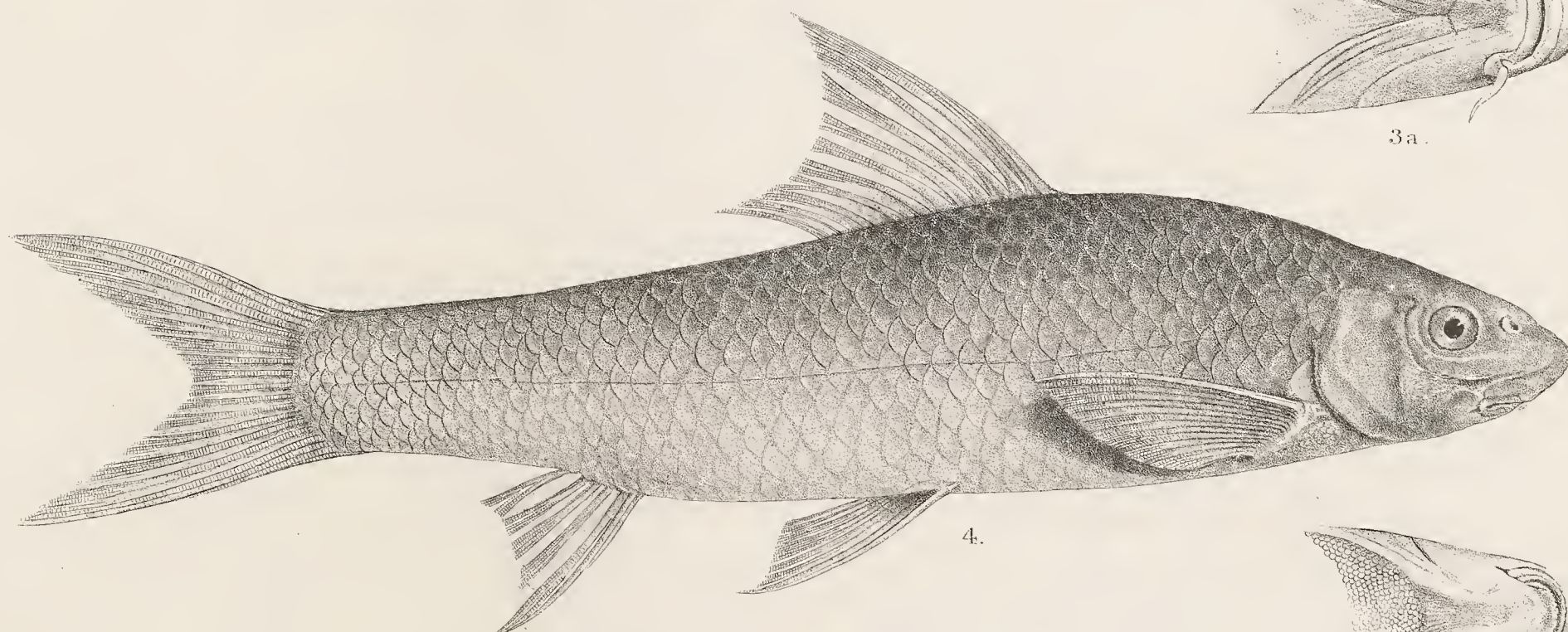
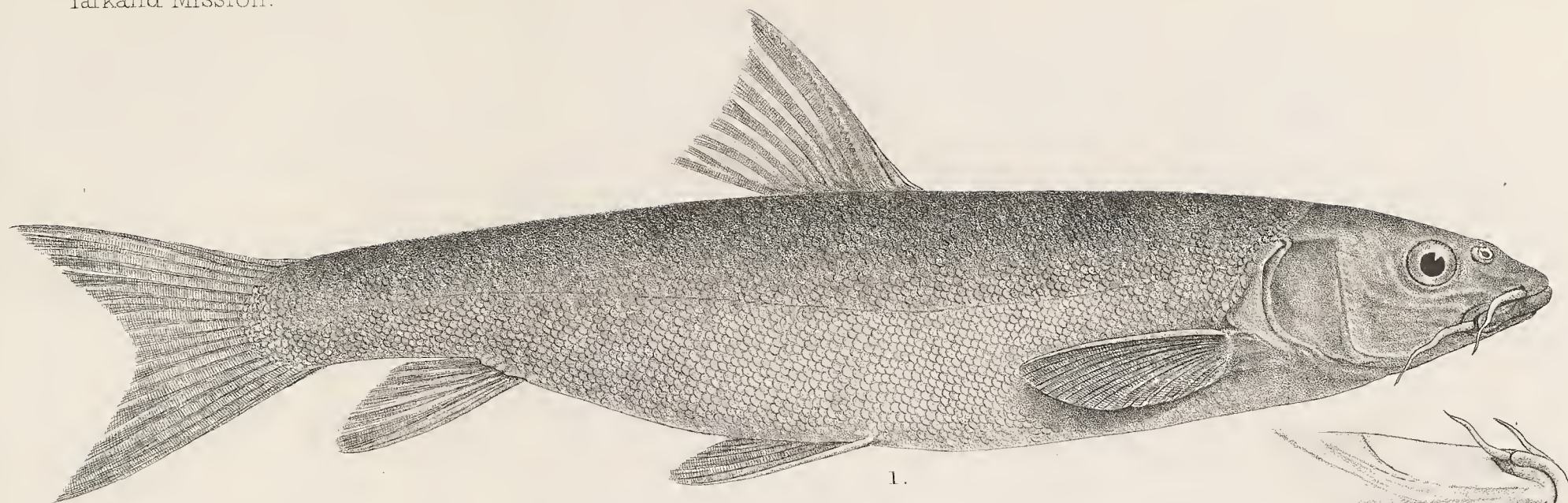
They extend from Eastern Afghanistan and Western Turkestan through Tibet, and the most westerly portion of China, along the Himalayas to the hills in the Yunnan direction.

Loaches (*Nemacheilus*) are likewise generally distributed; and it is remarkable, as I have already observed, that all are scaleless. The same appears the rule in Western Turkestan.

The conclusion, I think, we may fairly arrive at, after examining the fishes of Yárkand and the adjoining countries, is that we find a peculiar group of Carps (*Schizothoracinae*) which has spread almost due east and west from the cold and elevated regions of Eastern Turkestan, but of which the southern progress has been barred by the Himalayas.

If we look to the south, we see, as it were, that a wave of tropical forms of fishes has, at a prehistoric period, expanded over that portion of the globe where the Nicobars, Andamans, and the most southern portions of the continent of Asia and the islands of the Malay Archipelago now are, that this fish fauna has its northward progress arrested by some cause at or near where the Himalayas now exist and mark the division between the fish-fauna of India and that of Turkestan.

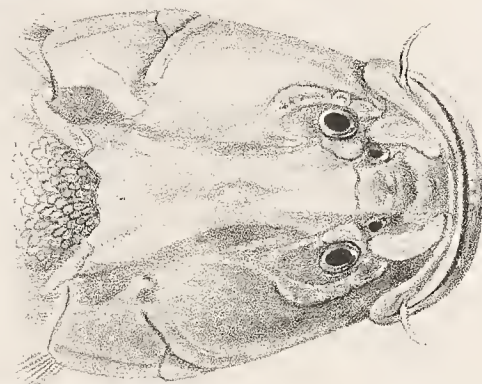
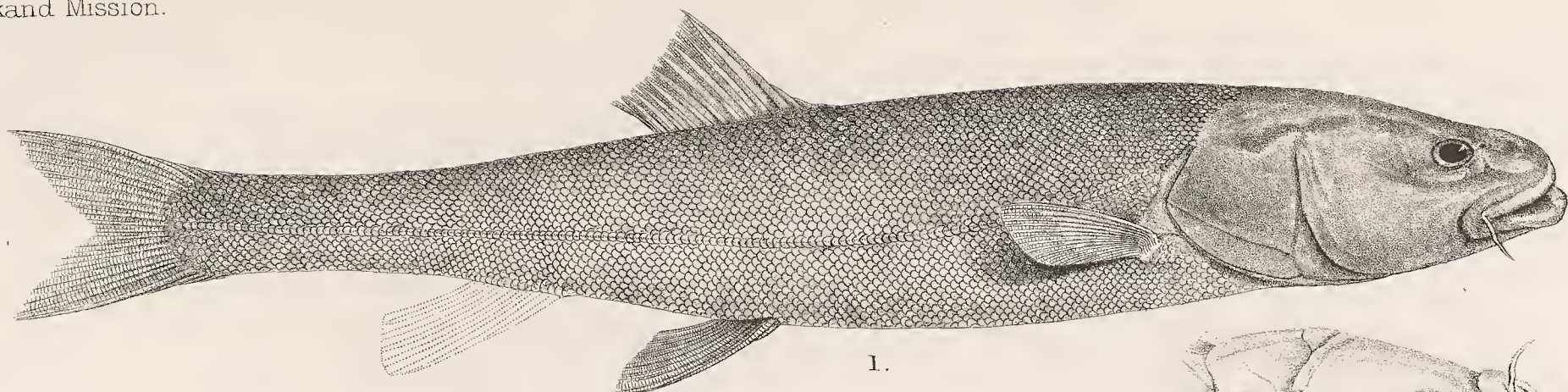




C. Achilles, del. et lith.

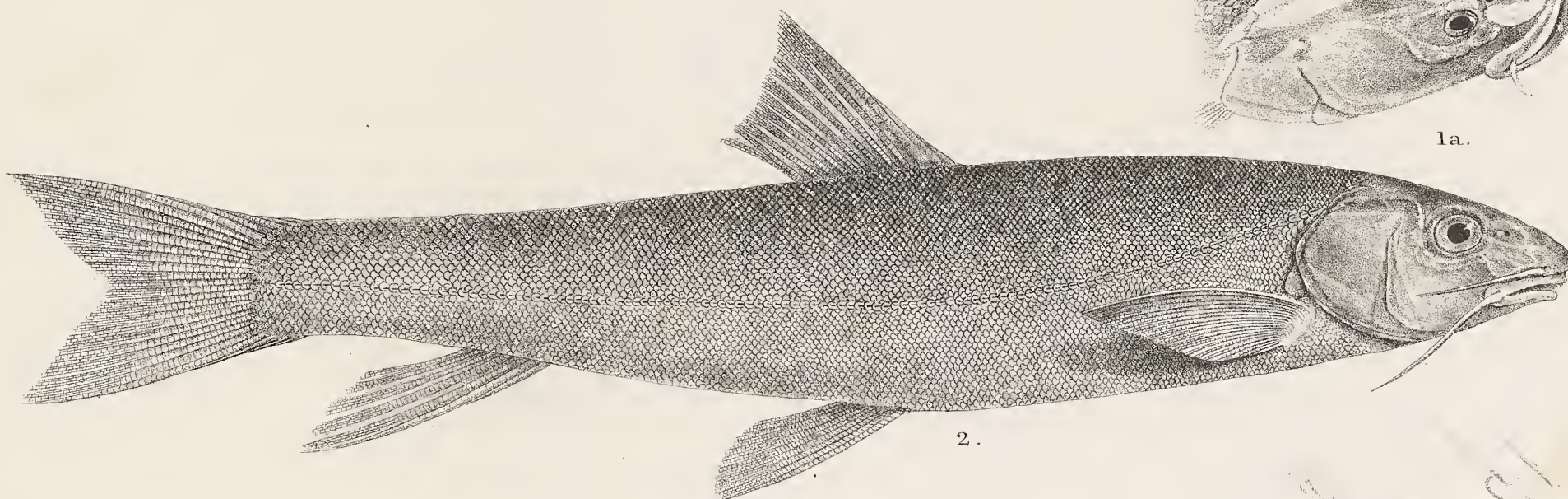
Marin & Hood, imp.

1. SCHIZOTHORAX INTERMEDIUS. 2. SCHIZOPYGOPSIS STOLICZKA. 3. DIPTYCHUS MACULATUS.
4. CIRRHINA SINDENSIS.



1.

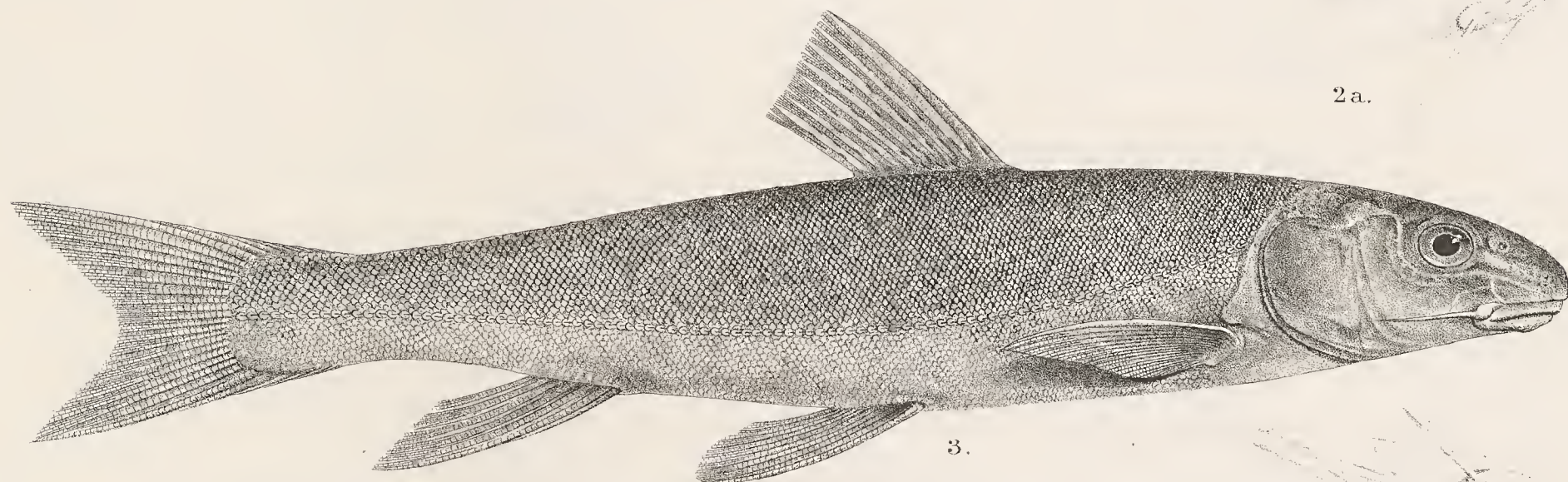
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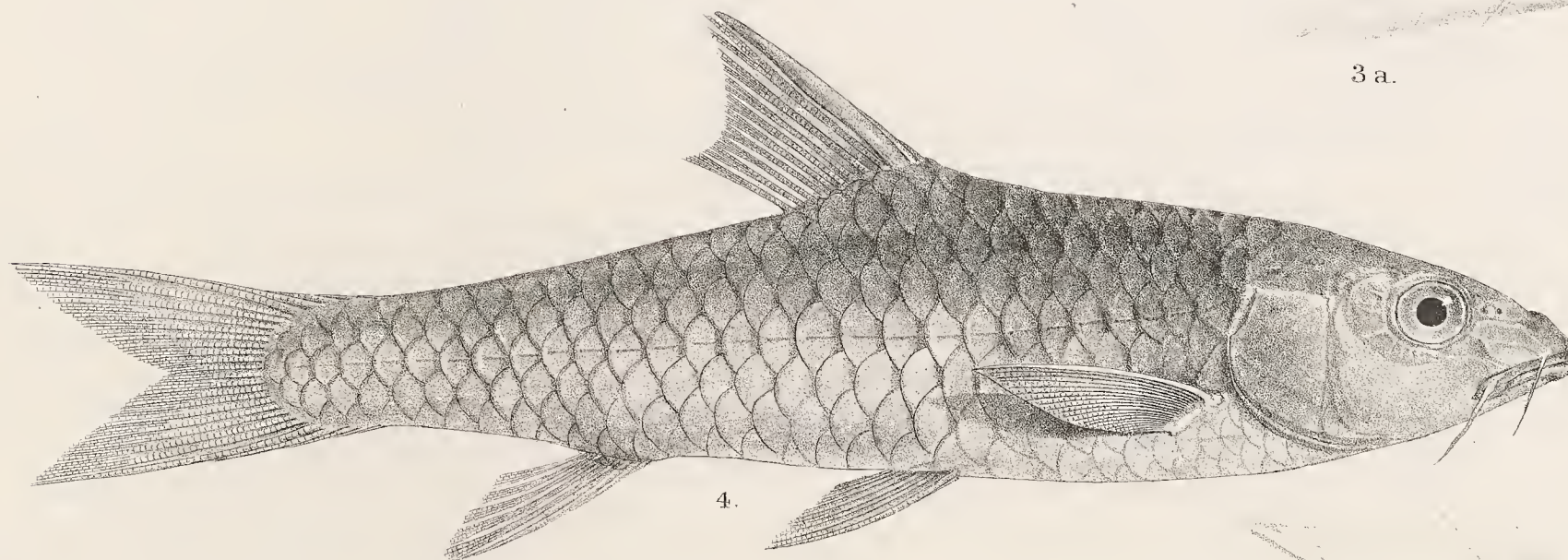
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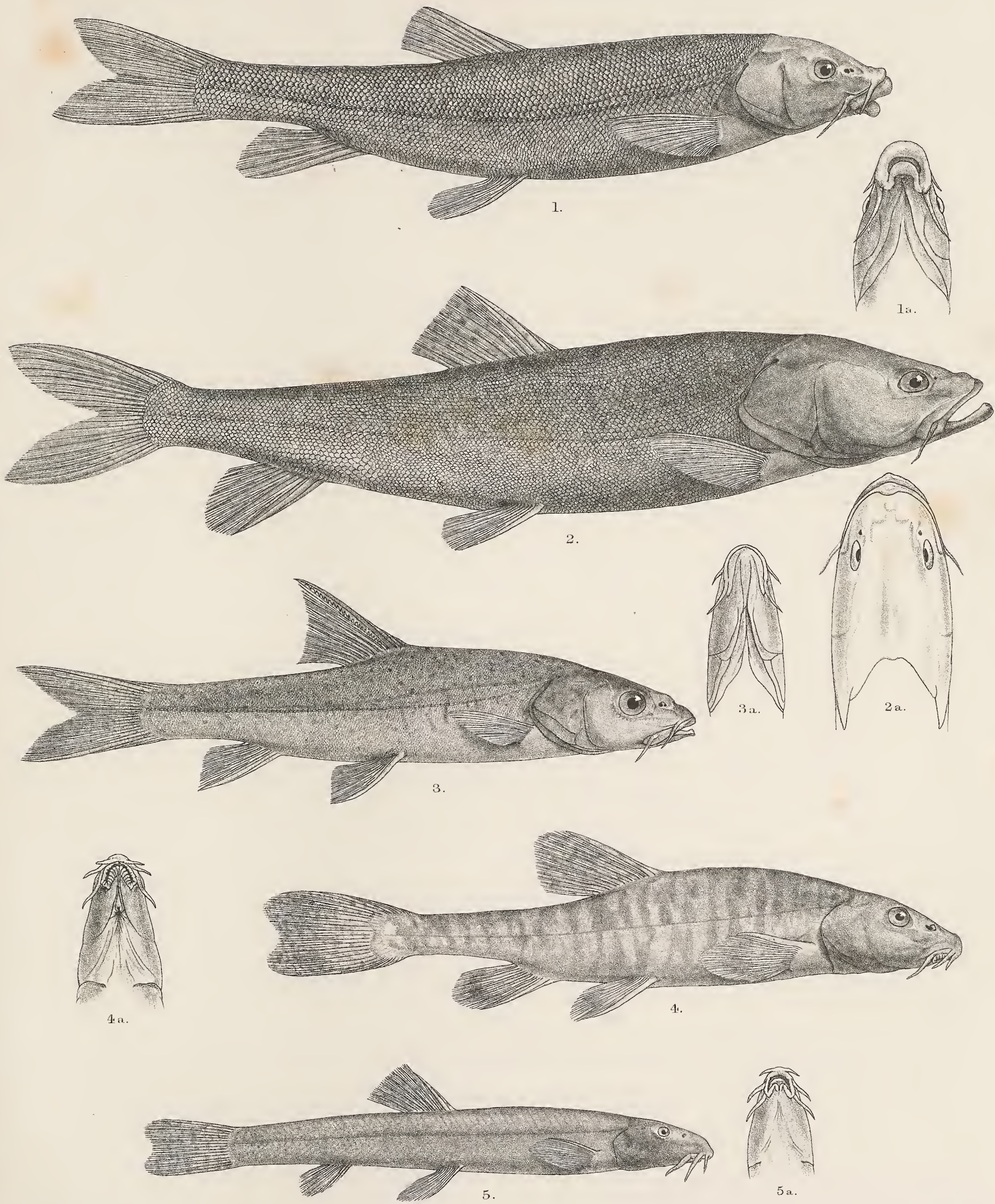
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4.



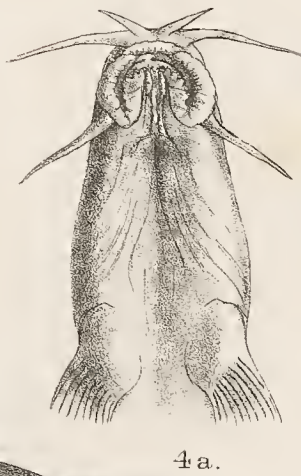
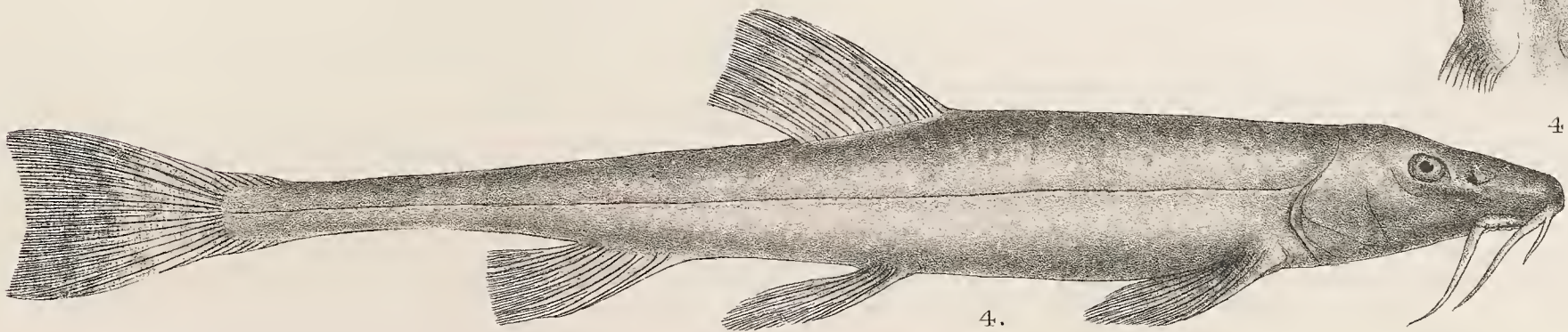
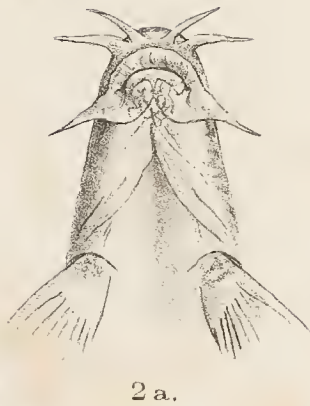
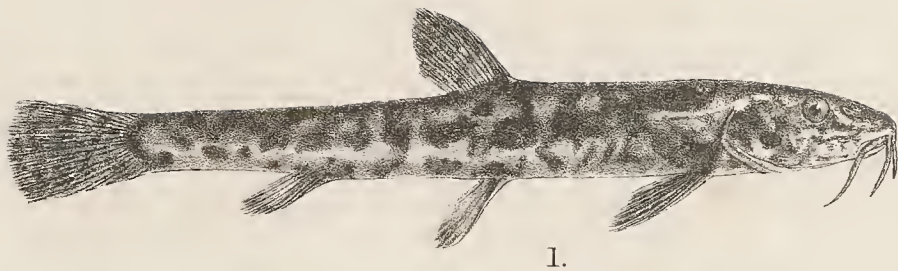
4a.



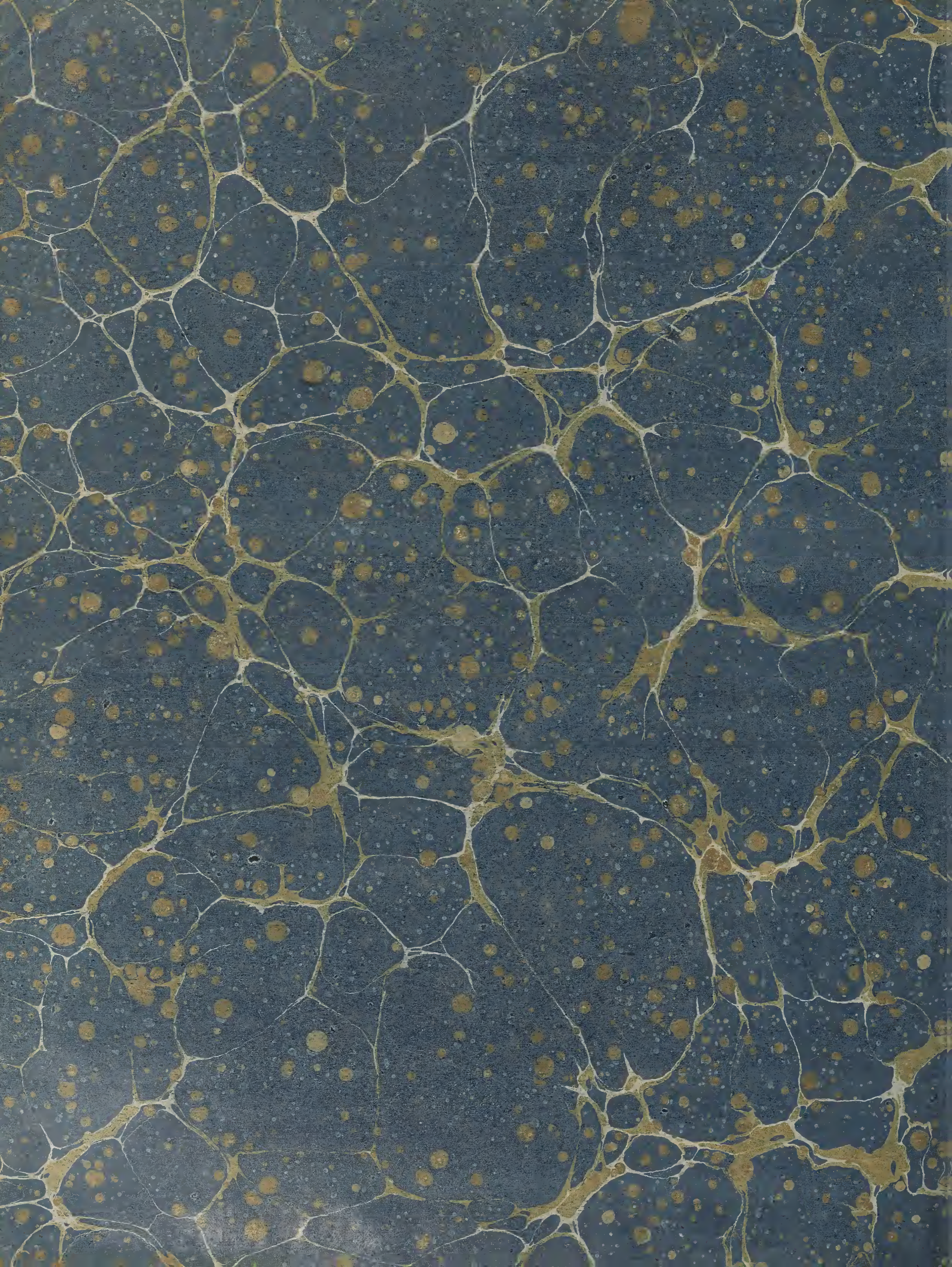
C.L.Griesbach del et lith.

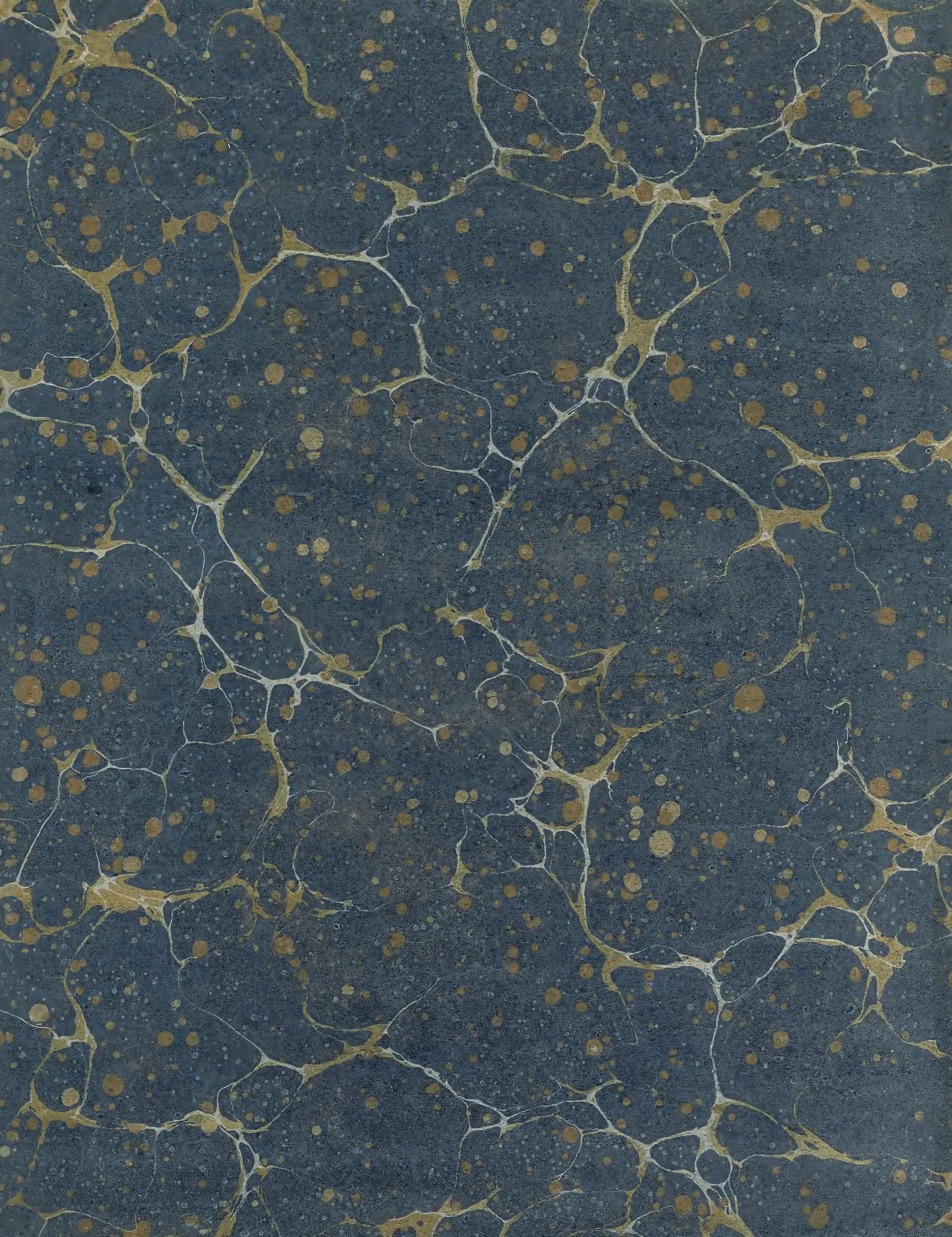
Mintern Bros. imp.

1, SCHIZOTHORAX IRREGULARIS. 2, PTYCOBARBUS LONGICEPS. 3 SCHIZOTHORAX NASUS.
4. NEMACHEILUS LADACENSIS. 5, N. GRACILIS.



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